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AN

ABSTRACT

OF

A COURSE of LECTURES

ON

Anatomy and Phyſiology;

AS DELIVERED

By A PROFESSOR of ANATOMY,
in LONDON.

pr * under lectures

UT AGER SIT, SINE CULTURA,
SIC ANIMUS, ABSQUE DOCTRINA.
CICERO.

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LONDON:
Printed for the Author, and ſold by P. BRETT,
No. 201, oppoſite *St. Clement's Church*, in
the *Strand*.
M.DCC.LXXXIV.

TO

JOHN SHELDON Esq.

F. R. S.

PROFESSOR of ANATOMY, in the
ROYAL ACADEMY,

AND

READER on ANATOMY,
in *London*.

SIR,

THE diſtinguiſhed eminence you hold in your profeſſion, had I no other motive, would induce me to court your protection, to this, my firſt performance.

Your candour will, I truſt, excuſe me in making the attempt, prompted by a wiſh, of proving in ſome degree uſeful, to the gentlemen, Students in Anatomy.

At the ſame time, I embrace this opportunity, thus publicly to acknowledge the advantages, I have received, in this moſt eſſential part of my profeſſion, from the inſtructions, and many improvements, ſuggeſted in your lectures. A deſire that they may be generally known and frequented, has principally influenced, the dedication of this.

May your future labours, be crowned with the ſucceſs, your preeminent talents deſerve, is the wiſh of,

Sir,

With reſpect and gratitude,

Your obliged,

Humble Servant,

London,
Seb. 15, 1784.

The Author.

PREFACE.

IT may be neceſſary to apologize, for intruding on the public, a performance of this kind, when there are ſo many excellent books already extant, on every part of anatomy, and phyſiology.

The motives, however, that influenced the author to the publication of this, are ſuch as will always give him pleaſure, in whatever manner it may be received by the world.

To obviate a practice, ſo univerſally detrimental, of thoſe gentlemen taking notes, who perhaps cannot afford themſelves time, to attend more than two courſes, muſt evidently be attended with advantages, if it can be accompliſhed.

The late Mr. Falconar was ſo ſenſible of this, that he publiſhed a ſynopſis of his lectures, but it contained ſcarce more, than the heads of the ſubjects, of which he was to treat; of courſe, ſo dry and unentertaining, as not to be read over, either previous to attending lectures, or after. The arrangement of the lectures, now delivered, added to the preceding circumſtances, has rendered that performance, almoſt totally neglected. How far the preſent may anſwer, the candid public muſt judge.

The author has attended repeated courſes, the accuracy of his notes are now put to the teſt; not but that ſome of the opinions advanced in it, and ſome of the inferences drawn from them, are his own, and others are borrowed from authors of reſpectability; though in a work of this kind, which is intended to be as near the delivery of the profeſſor, as it well can, it was not thought neceſſary to mark the quotations.

In arranging the matter, unaſſiſted by any perſon, the author has endeavoured to be as clear, and conciſe, as poſſible.

The dedication, and the work, are both entirely unknown, to the gentleman to whom it is inſcribed. The motives that induced them, have been already mentioned.

Should it anſwer the end propoſed, the author will feel himſelf amply repaid his trouble, and intends completing the work, in two other ſections.

If on the contrary, it meets neglect, and contempt, he will ſubſcribe to the opinion of the public, not doubting it's juſtneſs, nor lamenting his fate, amongſt thoſe, who have endeavoured, though unſucceſsfully, to contribute to the public weal, hoping it may be undertaken by an abler hand.

ERRATA.

Page 11,	line 20,	for *by* read *into* for *into* read *of*
48,	20,	dele *ſ* in *ariſes*
49,	27,	for *left* read *right*
53,	12,	read *vaſa*
66.	18,	dele *and conglomerate*
67,	27,	for 1662 read 1627
96,	23,	for *condulos* read *kondulos*
108,	18,	conſider *They* as beginning a freſh paragraph
109,	27,	for *expſoure* read *expoſure*

N. B. The greek words are printed in Italics, as they are pronounced.

There are a few literary errors, and faults in the punctuation, which the candid reader will excuſe.

LECTURES
ON
ANATOMY & PHYSIOLOGY.

The Hiſtory of Anatomy.

5 THE Term, Anatomy, is derived from the greek words, *ana*, and *temno*, diſſeco, and ſimply ſignifies a ſection or diviſion of any bodies into their conſtituent parts. It having been found, that vegetables have organs, as well diſpoſed as animals.

It is divided into two kinds.

Anatomy properly ſo called; and which gives the hiſtory of the human body:

And,

Comparative anatomy; which gives the hiſtory of other animals, and alſo vegetables.

The term is now generally underſtood to ſignify, a knowledge of the ſtructure of the human body.

To ſtudy this art, we are to conſider it from it's beginning; and alſo to enquire after thoſe men, who are diſtinguiſhed in it. For theſe purpoſes, Monſ. Portal's Hiſtorie Anatomie, in 7 vol. and the late Baron Haller's Bibliotheca Anatomica, may be read with advantage. and

As the antiquity of a ſcience, contributes in no ſmall degree, to it's importance in the world; ſo ~~teachers~~ professors always wiſh to trace their's as far back as poſſible: to this we are now to proceed.

Hippocrates &c

~~THE Antients knew but very little of~~ it, and the greateſt improvements and diſcoveries, have been made in the preſent century. most probably

The ſons of Æſculapius were totally ignorant of it. but it appears

The grecian phyſicians firſt paved the way to it's knowledge; ~~but to Hippocrates~~ and to him are we chiefly indebted, for his diviſion of phyſic and anatomy; in which latter he ſeems to have had ſome knowledge, but was certainly in ſeveral errors; confounding arteries and veins, and nerves and tendons. He was not acquainted with the circulation, nor the animal œconomy. He publ

A few years before Chriſt, Plato and Ariſtotle cultivated anatomy as a ſcience. The latter of theſe, was the firſt who illuſtrated his deſcriptions by figures, the importance of which, is too obvious to need any comment.

We are but little acquainted with the eaſtern knowledge of anatomy. The two Ptolemys founded a college for the ſtudy of it in Alexandria.

1 In Galen's works we find, that Herophilus and Eraſiſtratus were cotemporaries and were both men of ſkill and eminence in their time. Galen is suppo

3 We are unacquainted with the roman knowledge: but the word, *medicus*, we remember to have heard in roman hiſtory; and that thoſe men who practiſed it were ſlaves, not freemen. Anatomy was not practiſed there till after Chriſt. Celſus ſpeaks of ſeveral anatomiſts, and recommends the ~~ſtudy of the art.~~ he is also

2 Galen is ſuppoſed to have known the action of the heart, the muſcles, to have underſtood the manner of the voice, and the uſe of the valves of the heart; and

his obſervations on the pulſe, may yet be read with advantage. He divided the aneuriſm into two kinds, true, and falſe; his ſyſtem was adopted for a period of 1200 years, but his opinions are founded on hypotheſis.

In the twelfth century, by a decree of Philip of Spain, no perſon was ſuffered to practiſe phyſic, but who had ſtudied anatomy.

In the fourteenth century, printing was diſcovered.

In the fifteenth century, Veſalius was born at Bruſſels. He was profeſſor of anatomy at Padua, and was the firſt who gave names to the muſcles.

Fallopius was a cotemporary, and made ſeveral diſcoveries.

Euſtachius alſo flouriſhed at that time, and his tables were more accurate than any of the others.

In the ſixteenth century, ſeveral diſcoveries were made. Aſſelius obſerved the lacteals, and was convinced they took up the nutritive parts of the food; he alſo named them. Imperfect mention is made of them by Hippocrates and Herophilus.

Dr. Harvey, phyſician to King Charles the firſt, diſcovered the circulation of the blood. He was ſucceeded by Fabricius, and others

Vanderlinden attempted to prove, Hippocrates underſtood the circulation; but it is certain he did not, as he compared the blood circulating in the body to a circle, and paid no regard to the pulſe.

Galen was never mentioned as an opponent, though he came nearer the truth.

Eraſiſtratus made ſeveral diſcoveries, but he thought, when the blood went into the arteries, a fever enſued.

Veſalius has ſome pretenſions to the diſcovery, but, beyond all doubt, to Dr. Harvey we are indebted, for the diſcovery of the motion of the blood.

The pancreatic duct was diſcovered about thirty years after, by Wirtſungius.

And about the ſame time, the thoracic duct was diſcovered by Pecquet.

Ruyſch flouriſhed about the ſame time, and made ſeveral uſeful diſcoveries.

The Royal Society of London, firſt introduced medicine amongſt them.

Dr. Lower attempted to uſe the blood of one animal for that of another; but this was diſcovered by Abaſius. In large hæmorrhages of the uterus, &c. this might be ſerviceable; but this doctrine was haſtily taken up, and as haſtily laid aſide.

We now come to conſider the ſtate of the ſcience in different countries.

In Italy, Malpighi was much celebrated, and firſt uſed the microſcope; but at preſent, it is on the decline there.

In Switzerland there is but little done.

In France, Riolan's method was adopted, and ſocieties eſtabliſhed. Winſlow, a dane, was the principal writer there.

In Germany, till lately, little was done: but the number and value of their works, is now, greater than that of any other country.

The moſt celebrated german profeſſors are, the late Dr. Heiſter, the late and preſent profeſſor Meckel, Scarpa, and others. Amongſt them, Liberkuin; who firſt diſcovered the origin of the lacteals, the valve of the colon, and it's uſe: vide his works publiſhed by Sheldon.

The late Baron Haller improved the ſcience, more than any man of his time.

In Holland, there were many excellent authors. Bidloo compoſed an original work; and the great work of Albinus is unrivalled.

In England, Gliſſon, Cowper, and many others have diſtinguiſhed themſelves; amongſt them, the late celebrated Dr. Hunter, and Mr. Hewſon. But here, ingenious experiments on the animal œconomy, are more cultivated, than anatomical deſcriptions.

It has always been cuſtomary for the profeſſors of anatomy, to mention the beſt authors, on the different parts of the ſcience, and they are allowed to be the following.

Keil, and Cheſelden, } with Winſlow as a dictionary.
Heiſter's Compendium of anatomy.
Leber prelectiones anatomicæ.
Albinus's edition of Euſtachius's tables.
Bidloo's tables by Cowper.
Cheſelden's folio with Zinn's plates; Monro, and Albinus, } On oſteology.
Weitbrecht on ligaments and cartilages.
Neſbit on cartilages.
Douglas, and Monro's edit. of Innes, } On the muſcles.

Senac on the heart.
Haller on the arteries.
Winſlow on the veins.
Rudbec's,
Bartholin's } Works.
Nuck's,
Monro,
Hewſon, } On the abſorbents.
Sheldon,
Euſtachius,
Meckel,
Nabore, } On the nerves.
Monro,

Haller's elementa phyſiologica, with Malpighi and Ruyſch's tables, to ſtudy the different organs.

Du Verney on the ear

Zinn on the eye.

Morgagni de cauſa et ſede morborum.

Dr. Needham on the peculiarities of the fœtus.

Dr. Nicholls's anima medica.

The beſt authors for comparitive anatomy, are Linnæus, Blaſius, Swammerdam, Du Buffon, and Monro.

For ſurgery; Heiſter; Le Dran, Pott, Bromfield, Warner, Sharp, Aitken, Bell the London Medical Obſervations, and Edinburgh Medical Eſſays.

Of the Properties of Animals and Vegetables.

BEFORE giving the general hiſtory of the fluids, it is neceſſary to mention, the properties by which animals are diſtinguiſhed from vegetable bodies.

And firſt then,

Animals are diſtinguiſhed from vegetables, by having volition: to wit, a will, or locomotive power.

Alſo in having a ſtomach. In animals, the food is taken in by the mouth, is maſticated by the teeth and jaws, and is conveyed into the * ſtomach; where it undergoes the proceſs of digeſtion, and is converted into the animal fluids, which are taken up by the abſorbent ſyſtem.

Vegetables have no ſtomach, nor proceſs of digeſtion. Their nouriſhment is immediately converted into the eſſenti-

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* The gaſtric juice is analogous to the runnet, and is the principal menſtruum in digeſtion; which proceſs is completed in the ſtomach, and inteſtinal canal; the pylorus retaining the aliment and juices, in the ſtomach.

The pancreatic juice, is nearly analogous to the ſaliva; the particular properties of it, are unknown.

um animale, without going through any proceſs.

Animals have organs of ſenſe, to be enabled to diſtinguiſh different objects, and to move from place to place.

Animals are made up of ſolids and fluids: the firſt continually waſting, the other ſupplying the waſte. So if the ſolids are waſted in a greater degree (either by diſeaſe, or any other cauſe) than the fluids can recruit, an atrophy is produced. And if the fluids are increaſed, in greater proportion than they are uſed, an increaſe of bulk is produced.

There are two kinds of power neceſſary for life.

Reſpiration, and Circulation.

The firſt, is a mixed involuntary power.

The ſecond, is a natural motion of the fluids, of all living bodies, conſtantly in action.

They are both proper to animals and vegetables, and when they are extinct, death enſues. For example, if you tie a vegetable, or place it in the exhauſted receiver of an airpump, it will die.

General Obſervations on the Fluids.

WE now come to conſider the animal fluids. The *fluids* are of three kinds; viz. *chyle*, *blood*, and *ſecreted fluids*. There are alſo, two kinds of excrementitious fluids; *urine*, and *perſpiration*.

Chyle, is made in the *ſtomach*, and *ſmall inteſtines*; it is abſorbed by the *lacteals*, (which originate from the *ſtomach*, and *villous coat of the inteſtines*) into which it enters, by capillary attraction, and the valves prevent it's retrograde motion: it paſſes on the **meſentery*, into the † *receptaculum chyli*; from thence, through the *thoracic duct*, into the veins; and through the right ſide of the heart, into the lungs. There the red blood is made, which is carried back by the left ſide into the heart; and by the *aorta*, circulated in the arteries through the body: the *veins* return that not uſed for nutrition. The *ſuperior cava* returns all the blood, circulated above the *diaphragm*; the *inferior cava* returns all, circulated below the *diaphragm*, into the right auricle of the heart.

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* Meſenterium, meſentery from the greek word *meſos* middle, and *enteron* inteſtine. It is a duplicature of the peritonæum; it prevents the inteſtines from twiſting, and keeps them in their proper places.

† This receptacle is not always to be found.

* * *

On the Blood.

BLOOD is given to all animals, for the purpoſes of nutrition, vivification, and ſecretion. When circulating in, or flowing from an animal, it appears * homogeneous; but it is not ſo. The firſt thing we obſerve after it is taken away, is coagulation. When expoſed to the air, it ſeparates ſpontaneouſly into two parts: viz. † ſerum, or watery fluid; and ‡ craſſamentum, the red cake, or cruor, which is compoſed of the coagulable lymph, and red particles.

Theſe are called, the eſſential parts of the Blood.

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* Homogeneous, from the greek words *omos* ſimilis; and *genos* genus, having the ſame nature and principles.

† Serum, ſo called from its ſimilarity to whey.

‡ The craſſamentum ſinks in the ſerum, but ſometimes ſwims from the ſurface, becoming dry.

The colour of the blood in man, quadrupeds, birds, fiſh, and the amphibia, is red; in ſome inſects, green; in water inſects, colourleſs and tranſparent. Salt to the taſte, of a gummy nature, readily mixing with water; does not appear ſaponaceous, or oily.

It's ſpecific gravity by Boyle $\frac{1041}{1000}$

By Dr. Jurin $\frac{1054}{1000}$

the ſpecific gravity is alſo much greater in health, than diſeaſe.

It differs in different animals, and in animals of the ſame claſs, from various circumſtances; as health, diſeaſe, &c.

WE proceed to ſpeak of the particular properties, of the component parts of the blood; and firſt,

Of the *red particles*, commonly, but improperly called, the red globules. Theſe are more numerous in proportion to the perfection, and health of an animal, in the lower claſſes of animals, they are few; they give the *colour to the blood. Their

ſize

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* Dr. Cullen ſays, when viewed ſingly, they have very little colour; and that the colour always appears of a dark, or bright red, accord-

ing

ſize in different animals is different; they are largeſt in a ſkate, larger in man than an ox. In an human body, the 3240th of an inch, when laid in a longitudinal direction. Their ſhape in the human body, flat and round, like a piece of money; in ſome animals, oblong, or elliptical. Each particle is a compound, ſolid body, flat and round, conſiſting of two parts: viz. a ſmall ſolid particle, called the central particle; and an external covering, or veſicle, in which the former is contained like a pea in a bladder. Blood kept till putrefied, and diluted with water, ſhews with a microſcope, the veſicles burſting, and the particles rolling out. The particles may be made ſpherical, by an addition of water; and, by a mixture with a ſolution of neutral ſalt, may be again reſtored to their original flat figure. They are not more oily, ſaponaceous, or inflammable, than

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ing to the number of them.

Dr. Fordyce ſays, the colour is acquired in paſſing the lungs. When juſt paſt the lungs, they are ſcarlet, which is a mixture of modena red, and yellow; they become darker, till they get back to the lungs again; and that the colour is not capable of being changed by dilution.

the other parts of the blood. They do not form ſolids, or become organized; but are ſoluble in water, and other fluids, except the coagulable lymph and ſerum, which is prevented by the neutral ſalts contained in them. Their proportion in a healthy man, about $\frac{1}{8}$ of the whole maſs; more in a ſound ſtate, than in a dropſy. They are ſweet to the taſte, inodorous, and void of ſtimulus; and heavieſt of all the animal mucilages. The uſe of theſe particles is entirely unknown.

The * *coagulable lymph*, whilſt in the courſe of the circulation, is ſuppoſed to be, of all other fluids, the moſt ſubtle. But when out of the courſe of circulation, or when received into a veſſel, becomes a ſolid, on being expoſed to the air. It gives firmneſs to the craſſamentum, from which it may be taken out by continually ſtirring the blood with a ſtick, to which it adheres, and the red particles ſubſide in the ſerum.

The coagulable lymph, when circulating in the body, cannot form a ſolid; but when out of the circulation, it forms the large maſſes in aneuriſms, and plugs at the extremities of divided veſſels, and by that means ſtops hæmorrhages.

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* Fibra ſanguinis of Gaubius, and Malpighius; coagulable lymph of Senac.

The **polypi*, formed after death (which is frequently the caſe) are by blood left in the pulmonary artery; from which the red particles ſubſide, and the coagulable lymph forms a polypus.

Moles, vulgarly and improperly called, falſe conceptions, are formed in the uterus in a flooding, by the red particles ſubſiding, and the coagulable lymph adhering.

In a caſe of peritonitis, the coagulable lymph was thrown out by the exhalant arteries formed a ſolid on the *peritonæum*, and became organized.

Alſo where it is thrown out from the lungs on the *pleura*, it adheres and becomes organized. Few people in this climate, but have an adheſion of the pleura and lungs, in this manner. The coats of the veſſels have a plaſtic power, to change the mode and time of coagulating.

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* Polypus, from the greek word, *polus*, multus, many, and *pous*, pes, a foot, an animal having many feet, It is here applied to a concretion of blood in the heart, or in the large arteries near the heart.

When once it is coagulated, it is inſoluble, except in ſtrong acids, alkalies, &c. by which it's properties are deſtroyed.

It is alſo the nutritious part.

It has a fibrous appearance, eſpecially when taken on a ſtick.

The *ſerum*, is a watery mucilaginous fluid; ſeparates ſpontaneouſly from the craſſamentum, is divided into ſerum, and ſeroſity; colour in health, a blueiſh yellow; is homogeneous, coagulates in 160 degrees of *Farenheit's thermometer*, like the white of an egg, but leaves a ſmall quantity of a fluid, which is called the ſeroſity: this is the redundant part of the blood, thrown off by the kidneys. Mixed with water on agitation, by the experiments of Mr. Hewſon, appears an opake fluid, like milk: but we could not make it appear ſo. The inſpiſſated, or coagulated ſerum, is the remains of the coagulable lymph in the ſerum, not ſeparable; or it may be eſſential to the ſerum itſelf. It contains a neutral ſalt, compoſed of ammoniacal and ſea ſalt: the uſe of which is, to keep the red particles in their proper form. When inſpiſſated it is ſoluble in water.

The milk-white ſerum, is owing to a reabſorption of the fat, or animal oil. A man, who had this diſeaſe ſeveral times, was always relieved by evacuations, which is the proper method of treatment. *

† Heterogeneous ſubſtances, are occaſionally contained in it; as oil in the globules, and bile &c.

Chemical Analyſis of the Blood.

It is decompoſed by heat, according to the following experiments of Haller.

In 100 degrees of Farenheit's thermometer, produces a ſteam, with a volatile, ſubtle, particular ſmell.

200 degrees, ten ounces of blood were evaporated, and the maſs left dry.

300, produces a volatile ſalt, with empyreumatic oil; and a black coal, and yellow earth.

The component parts of the blood, are

Earth, $\frac{1}{75}$

Air, $\frac{1}{25}$

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* Mr. Wood, a miller, of Billericay in Eſſex, had this complaint, and lived many years on a pudding of wheat flour and water only.

† Heterogeneous from the greek words *eteron* alterum, another, and *genos* genus, kind.

Water, $\frac{5}{6}$

Oil, $\frac{1}{25}$

Volatile ſalt, $\frac{1}{25}$

Iron, 10 ½ grains in 10 ounces. This is by the experiments of *Dr. Raleigh* accounted for, by uſing iron inſtruments.

Haller thinks iron is a conſtituent part of the blood, but it ſeems rather to be taken by the water into our bodies, in which there is always a great quantity.

Mr. John Hunter ſays, there is a ½ gr. of iron, in 63 oz. of ox blood, and that it is adventitious.

The french chemiſts ſay, the blood contains more phoſphoric acid, than the urine, and the bones ſtill more, than the blood.

In arteries, the blood is of a florid red bright colour.

In veins, dark and black: the venous blood by being long expoſed, looks florid, which is by the phlogiſton being removed. The venous blood contains more phlogiſton than the arterious.

A ſurgeon being ſent for to a man, who had cut his throat, from ſeeing the blood of a dark colour, concluded it was venous, and was in hopes of ſaving him;

but he had divided the internal jugular veins, by which he bled to death.

The blood, in the pulmonary artery, appears like venous blood. *Vide Hewſon on the Blood.*

The blood has different appearances of colour in different ſubjects. Negroes, and mulattoes, darker than white people; and white, or european people, of different complexions, have different colours.

Dr. Harvey, in his Anatomical Exerciſes, ſays, the blood is a living fluid. This is aſſerted by Mr. John Hunter, in proof of which he ſays,

1ſt. It unites living parts. The coagulable lymph, thrown out by the pleura and lungs, is united; and as long as a part is capable of being acted on, by any ſtimulus, it is alive.

2ndly. The power of reſiſting heat, and cold. Taken in cold air, it raiſes the thermometer, as much, as blood taken in the moſt ſultry heat.

It coagulates later, when taken in diſeaſe, than health.

He mentions an extraordinary circumſtance of this living power, in the teſticle of a cock, introduced into a hen: it adhered, and became organized.

The blood is much thinner in inflammation, than in a ſound ſtate. This is not owing to obſtruction, but to an increaſed action of the veſſels, by which means, the red particles, which are ſpecifically the heavieſt part, ſubſide firſt; and then the coagulable lymph remains uppermoſt, and conſtitutes the buff.

The blood is often found in the lymphatics after death.

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On the Cellular Membrane, or Subſtance.

ALL parts of an animal body, are formed of *membranes*, *fibres*, or *inorganic matter*. Each of theſe are originally made from the *animal fluids*, by ſecretion, or ſome other proceſs. The fibres of the body, differ in their degrees of organization, and all ſolids are not organized. By organization, we mean circulation; and when we ſay, a part is very much organized, we wiſh to be underſtood as meaning, it has *nerves*, *muſcular fibres*, and *abſorbent veſſels*, as well as *arteries* and *veins*.

The ſolids which compoſe the body, are, the cellular membrane; muſcular fibre;

bre; adipoſe membrane; ligamentous fibres; *elaſtic, and inelaſtic, nervous, and bony fibres, and cartilages.

We ſhall firſt treat of the moſt ſimple, and alſo the moſt extenſive membrane, inveſting almoſt all parts of the body; and known by the name of the *cellular membrane*, or *ſubſtance*

The *cellular membrane*, or tela celluloſa of Haller, is made by the coagulable lymph, which is thrown out by the exhalant arteries. It is an elaſtic ſubſtance, and is found almoſt univerſally, in all parts of animal bodies. Except in the ſubſtance of the *brain*, and the *bones*, it is always found in the largeſt quantities, where a conſiderable degree of motion is wanted: as in the articulation of the *ſcapula*, with the *os humeri*; and in the *os femoris*, and *acetabulum*.

It is the moſt ſimple, and leaſt organized fibre of the body; inaſmuch as it is doubted by many, if it is organized.

Others ſay, it is organized: firſt,

By it's increaſing, as the other parts of the body:

Secondly, If a wound is made in any

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* The blood veſſels are made of theſe.

part of it, granulations ſhoot from it.

It certainly may have a proportion of growth, and yet not be organized; as, for example, the *cuticle* and *nails* are inorganic, but the hair may not be ſo.

Haller is clearly of opinion, that this membrane is inorganic.

It is the common connecting medium, is exceeding ductile, allowing of eaſy motion; and has interſtices moiſtened by a fluid, called *interſticial* fluid.*

It readily admits fluids to paſs, from one part of the body, to another; as *water*, *air*, &c.

We may be ſure a mortification has taken place below any part, when air appears in the cellular membrane.

The matter thrown out by *ſpiders* and *ſilkworms*, is the ſame as the cellular ſubſtance of animals.

This membrane, has by ſome been called, the reticular ſubſtance, or network appearance; but theſe names are now laid aſide: we mention them only, that it may be known to you, when reading authors on it.

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* This fluid is the coagulable lymph and ſerum, thrown out by the exhalant arteries; and taken up by the lymphatics, it is coagulable, except in anaſarcas, when it will not congulate. It is the ſame as the fluid in the cavities of the thorax, pericardium &c.

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On the * *Adipoſe Subſtance.*

THE next ſubſtance we are to conſider, is a large gland of the conglobate, or lymphatic kind, filling all the vacant ſpaces of the body, and uſually called the *adipoſe membrane;* a name very improper, being evidently glandular.

It is formed of ſmall † *cells*, which have no communication with each other. Each cell is ſurrounded by a network of arteries and veins.

It is wanting in the *ſcrotum*, *eyelids*, *penis*, *inteſtines*, and *lungs:* but there is a large quantity contained between the duplicature of the *peritonæum*, on the folds of the *meſentery* and *omentum*, on the *heart*, in the *orbits* of the *eyes*, in the *interſtices* of the *muſcles*, and in the external parts of the body.

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* Adipoſe, from adeps, fat, the apparatus in which the fat is contained.

† Cell, a ſmall bag or bladder.

In old animals, it is generally in the interior parts of the body; in young ones, in the exteriors.

It appears like the rows in fiſh, having veſicles, for the purpoſes of containing the animal oil, which is ſecreted by the exhalant arteries, from that part of the chyle not immediately wanted, and taken up in the form of oil, by abſorption.

It is fluid when the animal is living, and is contained in *molliculi*: this appearance may be very beautifully ſeen, *in the meſentery* of a kitten.

It's principal uſe appears to be, as a reſervoir of nouriſhment, as in the caſe of animals, who live a long time dormant; theſe being ſupported by an abſorption of the animal oil. In *aſcites*, or *anaſarcas*, the whole fat is reabſorbed: theſe are the only diſeaſes, which entirely deſtroy it. The *pthiſis pulmonalis*, does not ſo much ſo. All our animal oil is like lard. The experiments of Dr. Stark, prove fat to be the moſt nutritive of all other animal ſubſtances; one part of it being equal in nouriſhment, to five parts of lean.

It is harder in the *fœtus*, than in the adult ſubject; and is of all other ſubſtances the leaſt liable to putrefaction.

Of the Diſeaſes of the Adipoſe Subſtance.

THE diſeaſes of this ſubſtance are, the *milk white ſerum*, and *fatty tumours*, commonly called *wens.*

The firſt is cauſed by an abſorption of the fat, and the cure of it, has been before mentioned, page 18.

The latter are ſometimes formed in different parts of the body, and require extirpation.

Of the Diſeaſes of the Cellular Membrane, or Subſtance.

THE diſeaſes of this menbrane are the following,

Anaſarca,
Diffuſed Aneuriſm,
Abſceſs,
Emphyſema.

The [*] *anaſarca*, or *leucophlegmatia*, is when there is a large quantity of water, in the inſterſtices of this ſubſtance; and it is generally owing, to a relaxed ſtate of the ſolids.

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[*] Anaſarca, from the greek words *ana* per, through, and *ſarx* caro, fleſh.

The fluid which is found, in this diſeaſe, is the *interſticial fluid*; which being ſecreted, and depoſited in greater quantity than the *lymphatics* can abſorb it, or than is neceſſary for the purpoſes of the animal œconomy, occaſions the diſeaſe.

This diſeaſe may always be known by a tightneſs of the abdomen, and towards evening, an œdamatous ſwelling or pitting of the legs.

The intentions of cure are various, but we have only to mention the chirurgical part, the reſt belong to the teachers of the practice of phyſic.

The operation to be performed, is to make a ſmall crucial wound, deep on the inſtep, which readily drains out the water. Large wounds are very prejudicial, a mortification generally ſupervenes when there are many or large wounds.

Scarifications are always preferable to tapping.

The * *diffuſed aneuriſm*, is the diſeaſe,

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* Diffuſed aneuriſm from the greek word *aneureuno*,

eaſe next to be conſidered. It generally happens from bleeding, an artery being opened, the blood is immediately diffuſed, through this ſubſtance.

The intentions of cure, are, to apply the tourniquet to the arm immediately, (if it is not at hand, a roller ſhould ſupply it's place,) the artery ſhould then be laid bare, and taken up, ſmall inciſions are to be made, as directed for the emphyſema, and the parts lubricated with oil. If this is not immediately done, a mortification is generally the conſequence very early.

The † *abſceſs*, is alſo a diſeaſe of this ſubſtance. It is formed by an inflammation of any part, which is owing to an increaſed action of the muſcular fibres of the arteries.

It is here neceſſary to make a few obſervations, on the fluid contained in abſceſſes. It has generally been defined to be produced, by an eroſion, deſtruction, or melting down of the ſolids. But this opinion is entirely erroneous; it is be-

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reuno dilato, to dilate (in ſurgery) ſignifies a wound of the artery, and the blood diffuſed into the cellular ſubſtance of the limb.

† Abſceſs a tumor containing pus.

yond all doubt, a ſecretion; by the incroaſed action of the veſſels of the inflamed part, the coagulable lymph being thrown out (by the exhalants,) in greater quantities than the lymphatics can abſorb it, ſtagnates: the heat of the part being alſo increaſed, prevents it's adheſion, and organization; and induces a fermentation converting it into pus; the mildneſs or virulence of the matter, is always in proportion to the ſtates of the diſeaſe, by which it is produced. Undoubtedly, matter will, if ſuffered to remain on any part, corrode and deſtroy it. But abſceſſes in the cavity of the *thorax*, and alſo in the *eye*, in the diſeaſe called *fiſtula lacrymalis*, and the *gonorrhea*, ſufficiently ſhew it to be *a priori*, a ſecretion only.

The difference that is perceived in the matter iſſuing, on the opening an abſceſs, and the ſubſequent diſcharge, is in conſequence of the expoſure of the part to the atmoſpheric air; a circumſtance very detrimental to all kinds of wounds, and ever as much as poſſible to be avoided.

The thin fluid, which is ſometimes found contained in tumors of this kind, is the coagulable lymph.

It is always to be remembered, that when matter is collected under any of the faſcia, or near the large blood veſſels, it ought to be let out as ſpeedily as poſſible.

The beſt method of opening large abſceſſes, is by ſeton; for which purpoſe, firſt, introduce a *trochar*, or *hydrocele inſtrument*, (*invented by Mr. Pott*,) then ſeveral ſetons well oiled, and over them apply a tight bandage; by this means the diſcharge is gradually increaſed, and the ulcer ſoon heals.

On the face, and in bubos in women, where as much ſkin as poſſible ſhould be preſerved, the knife is preferable.

In men, bubos are beſt opened by cauſtic, (the cutting out oval pieces, is not a good method) for this purpoſe, the *lapis infernalis* is beſt, but the matter ſhould be perfectly formed, before it is applied.

Abſceſſes of the breaſt, we adviſe not to be opened at all, emollient poultices being generally ſufficient, and the beſt method of cure. To prevent the formation of matter in the breaſt, an ingenious * gentleman, to whoſe labours the world are much indebted, for many improvements in ſurgery, has adviſed a ſolution of crude ſal armoniac two drams, in four ounces of hungary water.

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* Mr. Juſtamond.

The * *emphyſema* is a diſeaſe, in which the air, that was before in a fixed ſtate is let looſe into the interſtices of the cellular ſubſtance, inflating the † part. This diſeaſe is generally occaſioned by a wound in the lungs, and more frequently from lacerated, than punctured wounds; in the former by a fractured rib, which irritating the wounded lung, throws off the coagulated blood, and the air ruſhes into the cellular ſubſtance. Vide *Lond. Med. Obſerv. Edinb. Medical Eſſays.*

It is alſo produced, by a wound of the trachea.

It ſeldom happens from a wound, occaſioned by the puncture of a ſharp inſtrument, or a muſket ball. The blood which in this caſe iſſues from the wound, coagulates, and prevents an emphyſema.

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* Emphyſema from the greek word *emphuſema*.

† The reaſon that drowned perſons ſwim on the ſurface, is, by the air, which was before fixed, being let looſe into the cellular ſubſtance conſequently the body is lighter; and not from the quantity of water taken in, as was erroneouſly ſuppoſed.

We may be certain, whether it be air or water, contained in the cellular ſubſtance, by their different ſenſations; the air making a kind of crepitus, and the water leaving an œdamatous appearance. It is not the air itſelf, does ſo much harm in the emphyſema; it is the preſſure of the air on the lungs, is the cauſe of death.

In the firſt place, the intentions of cure are, to let out the air, by many ſmall inciſions, made into the cellular ſubſtance, on all the parts which are diſeaſed, lubricate your hands, and the ſkin with oil, and by this means the air will generally be evacuated. If it ſhould accumulate again, cut down, and give a free vent for the air, externally.

The operation for the emphyſema, is the ſame, as for the *empyema*, or abſceſs in the thorax, and the *hydrops pectoris*, and is as follows.

The patient is to be placed in an horizontal poſition, the ſide on which the operation is to be performed, inclining over the bed; the ſkin being then drawn up, as much as poſſible, the perforation is to be made with a ſcalpel, about two inches in length, between the ſixth and ſeventh rib, reckoning from above downwards, and in a valvular direction, as near the part firſt injured as may be. If that is too near the *ſpine*, or any thing indicates otherwiſe, it may be made about equal diſtance, between the *ſpine* and *ſternum*: after evacuating the air, the ſkin is to be drawn over the part, and a bandage applied.

If the air occupies a ſmall ſpace only, then apply a tight bandage or laced waiſtcoat, and this we recommend in fractured ribs, to prevent their elevation.

There are inſtances of emphyſema, in cattle, from putrid fevers.

Hydatids do not belong to diſeaſes of the cellular membrane.

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Of Ligaments.

WE proceed to conſider another of the moſt ſimple, and leaſt organized fibres of the body, known by the name of ligaments.

Ligaments are very univerſal, in the animal body.

The uſe of theſe ſubſtances, is, to connect the different parts of the body.

They are of two kinds;

* *Elaſtic*, and
Inelaſtic.

Elaſtic ligaments are made of cellular ſubſtance, are of a yellow colour, have few blood veſſels, and are but little organized. They ſerve as ligaments in the ſpinous proceſſes of the ſeventh cervical vertebræ, and between the backs of the bodies of the vertebræ, and their ſpinous proceſſes; in the ligamentum nuchæ colli, and on the brim of the acetabulum.

Their uſe is to aſſiſt us, in bending the ſpine and neck; for which purpoſe nature has put a large portion in thoſe animals, which gather their ſubſiſtence from the ground. And in ſome animals, a large quantity is given for ſupport to the inteſtines, by covering the muſcles of the abdomen.

Their action has no dependence on the will, therefore is not fatiguing, or expenſive to the conſtitution.

In a ſound ſtate, they are inſenſible;

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* *Elaſticity*, is a power, which ſome bodies poſſeſs, of conſtantly, and equally, endeavouring to contract themſelves, to that form, from which they have been diſtorted; and is not confined ſolely to animated matter.

but in an inflamed ſtate, exquiſitely ſenſible, and attended with great pain.

Inelaſtic ligaments, are of a white colour, like burniſhed ſilver, and of great rigidity.

They are given to connect parts, where ſtability is required, as bones; alſo to prevent luxations.

Luxations are ſeldom attended with lacerations of the ligamentous fibre, unleſs the parts are diſeaſed.

The inelaſtic is more vaſcular, than the elaſtic ligament.

It has nerves, but is little ſenſible in a ſound ſtate.

Diſeaſes of this ligament are attended with great pain, the cauſe of which ariſes from the veſſels being diſtended, and preſſing upon the nerves.

The tendons are formed of the inelaſtic ligamentous fibre.

They are vaſcular, and have nerves; their external ſurfaces, are ſmooth and poliſhed.

Their uſe is, to connect the muſcles to the bones.

The *dura mater, perioſteum,* and *tunica ſclerotica,* are made of inelaſtic ligamentous fibres.

The capſular ligament, is compoſed of two layers, the one external, from the perioſteum; the other internal, and exceedingly vaſcular.

The internal ſurface, forms a complete bag, and in a ſound ſtate, is perfectly inſenſible.

The fluid which is ſecreted in the joints, and which we call ſinovia, or the ſinovial fluid, is the ſame as neat's-foot oil in cattle. The uſe of this, is, to lubricate the joints, make the bones ſlip eaſy, and prevent abraſion.

The annular ligaments are bands, which bind the flexor, and extenſor tendons, and keep the bones of the hand, and foot, in their places.

The intermuſcular ligaments, between the brachius internus, is made of the inelaſtic ligamentous fibre.

The faſciæ or bands, by the antients called, *aponeuroſis, (erroneouſly ſuppoſed to be an expanſion of a nerve,) are tendinous

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[*] Aponeuroſis, from the greek words *apo* de from, and *neuron* nervus a nerve.

dinous expanſions, formed of the ligamentous fibre. They are found in different parts of the body; are vaſcular, and have nerves alſo, but are inſenſible in a ſound ſtate. Their uſe is to bind down the muſcles, and keep them in their proper places; as in the thigh and arm.

Interoſſeous ligaments, as the perichondrium, ſupply the place of bones, and give origin and inſertion to muſcles.

* * *

Of the Nervous Fibre.

TO underſtand the properties of the body, depending on the influence of the nervous ſyſtem, it will be neceſſary to premiſe, ſome general ideas of it's ſtructure.

In all perfect *animals*, as *man*, *quadrupeds*, *birds*, and many *amphibia*, as *turtle*, *ſeal*, *crocodile*, and *flat* and *ſpinous fiſhes*, a *nervous ſyſtem* is ſuperadded. But this is not abſolutely neceſſary for life, as it is wanting in *inſects*; and we know that the circulation may be carried on without the *brain*.

The *nervous ſyſtem*, is divided into two parts.

The firſt, *encephalon*, which is contained in the *cranium*, (note, *the human ſubject has more brain, in proportion to it's ſize, than any other animal*) comparitively it may be conſidered, the ſame to the *nervous ſyſtem*, as the *heart* is to the *vaſcular*.

The *encephalon* is ſubdivided into *cerebrum*, and *cerebellum*; the firſt of which is ſubdivided into ſix lobes, two anterior, two middle, and two poſterior; and theſe are all that can be ſeen in the cavity of the ſkull. On removing them we ſee the two lobes of the *cerebellum*, which lie poſteriorly, and appear *vermicular*.

The lobes of the brain, are all covered by membranes, called *meninges*.

The firſt external covering is the dura mater, and conſiſts of two lamina; the uſe of it is, to prevent preſſure on the brain.

The ſecond, called tunica * arachnoides.

The third is, the pia mater, which goes between the convolutions of the brain, and is a double membrane. All theſe membranes, go to make coverings to the nerves.

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* Arachnoides, from the greek words *arache*, a ſpider, and *eidos*, form, reſembling a ſpider's web.

The brain has four ventricles, two lateral, one middle, one poſterior.

Theſe all contain water, ſecreted by the plexus [*] choroides. When this fluid is ſecreted in too large quantities, the hydrocephalus internus is produced.

The ſecond part, is, the *elongation of the brain*, coming from both ſubſtances, and may be conſidered as a ninth lobe. It paſſes out at the *foramen magnum*, down the ſpine, guarded as in the brain, by the ſpine: this is called, the *medulla ſpinalis*.

From theſe ariſe, thoſe white, ſtrong, elaſtic chords, called *nerves*; diſtributed to all parts of an animal body, for the purpoſes of *ſenſation* and *motion*.

There ariſe nine pair from the brain.

And thirty-one pair from the medulla ſpinalis, making in the whole, forty pair of nerves.

Thoſe ariſing from the brain, are the following,

Firſt pair, *olfactory*; which are the

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[*] Plexus choroides, is a production of the pia mater, ſpread over the lateral ventricle.

organs of ſmell.

Second pair, *optic*; and are the organs of viſion.

Third pair, *motores oculorum*; theſe aſſiſt in moving the eyeball.

Fourth pair, *pathetici*; theſe expreſs the paſſions.

Fifth pair, *ſympathetic*: this is divided into three branches.

The 1*ſt* branch is the *opthalmic*;

The 2*nd*, the *maxillaris ſuperior*,

The 3*rd*, *maxillaris inferior*.

Sixth pair, *abductores*; they ſerve to draw the eye from the noſe.

Seventh pair, *auditorii*; theſe are divided into two portions:

Portio mollis, and

Portio dura.

The firſt ſupplies the *veſtibule*, *cochlea*, and *ſemicircular canals*, and is loſt in the inner camera of the ear, in a very ſoft pulpy ſubſtance: this is the immediate organ of hearing. *Portio dura*, paſſes through *Galen's foramen cæcum, vel aquæductus fallopii*, gives branches to the *malleus*, and to the *dura mater*; and alſo to the muſcles of the *head* and *neck*. It has by this means, conſiderable ſympathy with the *fifth pair of nerves*, and *ſecond* *cervical.*

Eighth pair, called *par vagum*: gives nerves to the tongue, *larynx*, *pharynx*, and *ganglion of the intercoſtal nerve.* At it's entering the thorax, it ſends off a large branch of each ſide, to make the *recurrents*; after theſe branches are ſent off, it ſends filaments, to the *pericardium*, *heart* and *lungs*; it alſo ſends branches to the *œſophagus*, and *ſtomach.*

Ninth pair, *linguales*; are diſtributed to the muſcles, and ſubſtance of the tongue. They ſerve both for guſtation, and performing the motions of the tongue.

The others are ſubdivided into *cervical*, *dorſal*, *lumbar*, and *ſacral*; deſcriptive of the places where they come out.

The nerves are a *ſine qua non*, for muſcular motion, and are the agents, by which the mind acts on the human machine: and by which it is again acted upon, which gives them a double capacity.

For firſt, they convey outwards, impreſſions.

Secondly, they convey inwards, impreſſions.

They have the power of volition, by which every thing is performed.

The *nervous fluid*, is not demonſtrable; but is ſuppoſed to be a modification of the *electric fluid.*

This is ſuppoſed to be carried from the *brain,* by the *nerves,* (which are the particular conductors) and acts as a *ſtimulus,* to make the muſcles contract.

This is the exciting cauſe of action.

The ſmalleſt fibre of a nerve, in the retina of the eye, is the 32,400th part of a common hair: this is computed from the *minimum viſibile.*

Profeſſor Monro ſaid, he could ſee the conſtituent nerves, by glaſſes.

The *torpedo,* or *ſkate,* has an electric property, and gives a numbneſs to any body touching it. Though the ſpark cannot be ſeen, it throws off the ſhock at two parts, in which the large nerves are ſituated.

By the *gymnotus,* or electric *eel* of Guiana, the ſame effects are produced: the nerves in it are very large.

A more minute deſcription of the *brain* and *nerves* will be given, and their uſes and ſeveral phenomena, will be explained at large, when we ſhew you their anatomical ſtructure. We only wiſh to give you general ideas of them at preſent.

Of

Of the Muſcular Fibre.

FROM the preceding view of the nervous ſyſtem, it is evident that the beginning of motion, in the animal œconomy, is generally connected with ſenſation. And the ultimate effects of ſuch motion, are actions depending on the contraction of the moving, or muſcular fibres, and this is called muſcular motion; which is neceſſary to all living animals, and which, together with their particular ſtructure, and organization, is now to be explained.

The *muſcular fibre,* makes all that part of the animal body, called fleſh.

It's colour in *man,* and *quadrupeds,* is red; in ſome *birds* and *fiſh,* white; in *inſects,* green.

The red colour is not inherent in the muſcle, but is owing to the quantity of blood, contained in it: as by waſhing and injecting a limb with water, and then making a tranſverſe ſection, it may be made white. And parts may be muſcular, though not red, as the *iris.*

The muſcles in the dead body, are ſoft

and inelaſtic; in the living, capable of exerting great force, and become ſtronger, in proportion as they are more uſed; (for example, chairmen's legs are much ſtronger, than their arms; and watermen's arms, ſtronger than their legs;) and weaker, in proportion as they lie ſtill: old, and bedridden people, are inſtances of this.

They have arteries, veins, nerves, and lymphatic veſſels: alſo cellular ſubſtance. There are many ramifications in a muſcle, and the veſſels go from a circumference, to a centre.

The arteries run parallel, and by the preparations of Liberkuin, muſcles appear nothing more, than a congeries of veſſels.

It was generally ſuppoſed, that the arteries opened into veſicles, which made the conſtituent part of a muſcle; and a diſtenſion of the part, was produced by this means, and cauſed a contraction.

If a muſcle is expoſed, it contracts, and is ſhortened. Vide Winſlow.

The ultimate fibre of a muſcle, is too ſmall to be demonſtrated.

The * *iris* of the human eye, ſerves to illuſtrate this, and to explain the doctrine of muſcular motion.

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* The *iris* will not contract by the electric ſpark

This is compoſed of arteries, veins, nerves, abſorbent veſſels, and cellular ſubſtance; which are the whole * apparatus neceſſary, to produce muſcular motion, without any conſtituent muſcular fibre, and which cannot be demonſtrated here. So, as muſcular motion is performed, without any conſtituent muſcular fibre being demonſtrable; hence we may fairly infer, it's abſence in all parts; more eſpecially, as the ſtructure of the ſuppoſed conſtituent fibriles, is not underſtood.

The muſcular power, is different from elaſticity; it's action is not conſtant, but dependent on the nervous influence; and is exerted by ſtimuli, which are of different kinds, viz.

Mechanical,
Mental,
And, others of a ſpecific kind.

ſpark, when the light is taken away it dilates, The *retina*, and *coroid coat*, contract by light thrown on them.

* The *funis umbilicalis*, which has this, on being injected with a common injection of ſize &c. loſt in right lines, one third of its meaſure, but gained one third of its meaſure, in contorted lines.

The firſt, is, the application of the powers and force of the body, to any object.

The ſecond, is the irritability, or vis motrix.

The others are of various kinds.

The *nervous fluid*, is a ſtimulus, and the moſt natural cauſe, of muſcular motion.

The *electric matter*, is a ſtronger ſtimulus.

The *bile*, may probably be the natural ſtimulus, to excite the periſtaltic motion of the *inteſtine*s and the *rectum*, to void the *fæces*.

The heart and diaphragm, are both involuntary muſcles.

In mortifications, the veſſels loſe their vital or muſcular power.

The properties of the body to be deſcribed here, as immediately dependent on, and connected with theſe parts, are the *ſenſibility, and irritability*

The *ſenſibility*, is a property of the body, by which applications to it, excite ſenſations in the mind. It is not a property of the mind, but the body, for the body is frequently ſenſible, when the mind is not affected: as for example, the mind may not be affected, yet the body may be very ſenſible; and, *e contrario*, an impreſſion of the mind may remain a great time.

The *irritability*, is a property of the body, which takes place in conſequence of certain applications to it, by which a motion in the moveable parts is excited, independent of the motion impreſt.

Of the Vaſcular Syſtem.

THE next ſubject for our conſideration, is one of the moſt important, in the animal œconomy; *viz.* the part which circulates the animal fluids, called the Vaſcular Syſtem.

The *vaſcular ſyſtem*, conſiſts of four parts.

A *heart*,
Arteries,
Veins, and an
Abſorbent ſyſtem.

In all human and perfect animals, we find arteries, veins, and an abſorbent ſyſtem: the centre of theſe is the heart.

The * heart is an involuntary muſcle,

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* It's minute ſtructure and organization we reſerve,

of a conic form, ſituated tranſverſely, between the two laminæ of the *mediaſtinum,* in the lower part of the cavity of the *thorax*; with it's baſe towards the right, and it's apex towards the left ſide, it's under ſurface flattened, towards the diaphragm. It is divided by partitions, as the *ſeptum ventricularum,* and *ſeptum auricularum*; and contains two muſcular bags, called *auricles*; and two other muſcular bags, called *ventricles.* It is covered by a very fine membrane, and is compoſed entirely of muſcular fibres, which paſs in every direction, and it has valves to prevent the retrograde motion of the blood. The heart is the chief organ of the vaſcular ſyſtem, and from it ariſes, the two principal arteries of the body.

Of the Arteries.

THE * *Arteries* are deſigned for nutrition, and ſecretion, conveying

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ſerve, till we give the *angiology,* or particular deſcription of the blood veſſels, and the circulation of the blood.

* Artery, from the greek words *aer,* aer, air, and *tereo,* ſervo, to keep.

animal heat, and as a ſine qua non, for muſcular motion.

They were firſt named by Eraſiſtratus, who ſuppoſed that they carried the finer parts of the blood, mixed with air, forming the animal ſpirits. They are hollow elaſtic tubes, beginning from the heart, to carry blood to the different parts of the body.

And are two in number, viz.

Aorta, and

Arteria pulmonalis.

The *Aorta*, or great artery, ariſes from the left ventricle of the heart, and gives off two branches, called aorta aſcendens, and aorta deſcendens.

The aorta aſcendens, ſends off branches, to all parts above the diaphragm.

The aorta deſcendens, carries down the blood, and ſends branches to all parts of the body, below the diaphragm.

The *arteria pulmonalis*, riſes immediately out of the right ventricle of the heart, and goes only to the lungs, carrying the blood, returned by the veins, through the right auricle, into the left ventricle.

There are ſeven *veins*; *ſuperior cava*, *inferior cava*, *four pulmonary veins*, and the *vena portarum.*

The firſt returns all the blood, circulated by the different branches of the *aorta aſcendens*, above the *diaphragm*; the ſecond, all circulated by the different branches of the *aorta deſcendens*, below the diaphragm, into the right auricle of the heart; from thence the blood is carried into the right ventricle, and by the *arteria pulmonalis* to the lungs. The two right pulmonary veins, return the blood from the right pulmonary artery, into the left auricle, and from thence it is carried to the left ventricle of the heart. The two left, return it from the left pulmonary artery, into the left auricle alſo, and from it the *blood* paſſes into the left ventricle, whence the *aorta* originates, diſtributing it, by it's branches, to every, the moſt minute part of the animal.

The power which circulates the blood, is the muſcular power of the *heart* and *arteries*, and the elaſticity of the arteries themſelves. The blood is thrown out by the contraction of the arteries, which is called the *ſyſtole*, this immediately brings on the dilatation, or *diaſtole*; for when the heart contracts, the arteries dilate

late, and *vice verſa.*

The *vena portarum*, or ſeventh vein, ariſes from all the chilopoetic viſcera, and carries the blood to the liver; there acting as an artery, it ſecretes the bile, and after having performed this important purpoſe in the animal œconomy, it carries the blood into the inferior cava, to be mixed, and returned with the reſt to the heart.

The branches near the heart, always go off at obtuſe angles; by this means, the momentum of the blood, is conſiderably diminiſhed. But at a great diſtance from the heart, the angles are very acute.

The courſe of the arteries is always in the centre of the part, in the bending ſides of the joints, (as in the *axilla*, inner part of the *cubit* of the arm, &c. which ſituation prevents their being ſtretched, or compreſſed, in the various motions of the body,) taking the ſhorteſt tracts, to the parts they are to ſupply. Independent of their giving off branches, they are increaſed as they proceed from the heart, and they are evidently inverted cones.

On ſome parts, they run convoluted,

(*e. g.*) the arteries of the *ſpleen*, *teſtis*, *uterus*, and *umbilical chord*.

There are two ſets of arteries in the body; the one, deep ſeated; the other, ſuperficial. By this diſpoſition, if either ſet is compreſſed, the other may carry on the circulation; and the * anaſtomoſes, which are found in all the large glands, and parts liable to preſſure, are deſigned for the ſame purpoſe.

They are alſo divided into three claſſes.

Sanguineous,
Seriferous,
Lymphatic.

The firſt, are thoſe, which carry red blood only.

The ſecond, thoſe which cannot carry red blood, but ſerum only.

The third, thoſe which carry lymph.

In the cornea of the eye, we cannot diſcern red blood, except when it is inflamed.

There are alſo *capillary*, and *exhalent* arteries, in different parts of the body.

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* Anaſtomoſis from the greek words, *ana*, per, through, and *ſtoma*, os, a mouth, by the antients underſtood to be veſſels opening on ſurfaces, by the moderns a communication of veſſels.

Mr. Falconar ſaid there are none in the glands.

dy. The former are very fine tubes. terminating on the ſurfaces of the body; the latter ſecrete a fluid, for the purpoſe of lubricating the different cavities of the body, and are alſo found on the *lungs* and *uterus*.

Arteries have three coats, which may be ſeparated.

The firſt, elaſtic, which has fibres in all directions, and a great number of blood veſſels for it's ſupport, called *vaſa vaſorum*. Nerves are alſo diſtributed on it.

The ſecond, muſcular, with circular fibres. This cannot be demonſtrated. On it depends, the ſenſation of bluſhing. It likewiſe gives them ſome degree of irritability: though this is much greater in the arteries of amphibious animals, than in thoſe of the human ſubject.

The third, or internal coat, is a very fine, ſmooth, denſe membrane; being intended to prevent tranſudation.

Theſe coats are all connected together, by cellular ſubſtance.

In the fœtus, there are two arteries, for the circulation of the blood; one of which is obliterated, after the birth, and degenerates into a ligament; when pervious, it is called *ductus, vel canalis arterioſus*

The two vertebral arteries, aſcend through the foramen magnum, and immediately uniting form the baſilary artery, which makes an anaſtomoſis with the carotid artery, called circulus arterioſus Williſii, from its having been diſcovered by him.

In an inflammation of the brain, the temporal artery may be opened with advantage. Eight or ten ounces of blood, obtained by this means, proves of more relief, than four times the quantity from the general ſyſtem. It muſt be opened longitudinally, leſt by a tranſverſe ſection, the ſeventh pair of nerves ſhould be injured, and occaſion a locked jaw, and other diſagreeble circumſtances: an inſtance of which we have ſeen.

In order to ſtop the hæmorrhage, apply a compreſs above and below.

* * *

On the Pulſe.

THE action of the arteries, is indicated by their pulſation, which has been called the Pulſe.

Pulſes are divided, by many phyſiologiſts, into a great variety; but this ſerves only to confuſe the ideas, and perplex the memory of the ſtudent. We ſhall only mention the moſt general diviſion, with a few remarks; leaving them to be accurately defined, by thoſe perſons, to whoſe peculiar province it belongs.

Fortis. We call it a ſtrong pulſe, when the artery vibrates, like the chord of a muſical inſtrument.

Debilis. When it feels enveloped in ſome ſoft ſubſtance, we call it a weak pulſe.

Magnus. A great pulſe, is when the artery feels larger than uſual; and *e contrario,*

Parvus. In a ſmall pulſe, the artery feels ſmaller. The ſmall pulſe from greater contractions, and that from the artery containing leſs blood, are eaſily diſtinguiſhed.

Celer, tardus, frequens, rarus. Theſe ſtates of the pulſe, indicate the different degrees of irritability in the ſyſtem; and are thoſe, which ought particularly to be attended to.

Durus. When the arteries act ſtrongly, the pulſe is in general hard, and this produces a variation in the blood, called the buff. *e contrario,*

Mollis. When the action of the arteries is diminiſhed, by bleeding or other means.

Plenus, vacuus. The quantity of blood in the veſſels, is alſo ſhewn by the pulſe. When the veſſels are diſtended, we call it a full pulſe; *e contrario,* when not ſufficiently diſtended, an *empty,* or *ſmall pulſe.*

Regularis, irregularis, intermittens. Theſe indicate the regularity, or irregularity of the contraction and dilatation of the heart; and the laſt is frequently a dangerous ſymptom, and a ſign of death. Though it is to be noted, people have been born with an intermittent pulſe, and have ſuffered no inconvenience from it.

The pulſe has a peculiar feel, in people having an aneuriſm, near the heart.

Other peculiarities have been mentioned, but we are unacquainted with any definition whereby they may be diſtinguiſhed.

The diameter of the arteries, is alſo known by the pulſe; this we call the medium, between contraction and dilatation.

We ſhall here repeat the different kinds of pulſes.

Fortis, ſtrong;	Or	*Debilis*, weak.
Magnus, great;		*Parvus*, ſmall.
Celer, quick;		*Tardus*, ſlow.
Frequens, frequent;		*Rarus*, rare.
Durus, hard;		*Mollis*, ſoft.
Plenus, full;		*Vacuus*, empty.
Regularis, regular;		*Irregularis*, irregular.

Intermittens, intermittent.

Dr. Heberden has given ſome obſervations on the pulſe, (in the Lond. Med. Tranſactions,) by which he proves, in how few caſes, it can be depended on.

The pulſe of a child, under two years old, ſhould be felt whilſt it is aſleep; and the following are the mean rates of the pulſe.

On the day of birth,	130—140.
Firſt year,	110—120.
Second,	90—100.
Third, fourth fifth, ſixth	90—108.
Seventh,	72— 80.
Twelfth,	70, and a few more.
Adults, a little below	60— 80.

A full meal quickens it, 10 or 12 pulſations; a variation of ten, indicates diſeaſe in the ſyſtem; that number below the natural ſtandard, ſhews an affection of the brain.

In an inflammatory fever, 120 is a dangerous pulſe; *except* in an acute rheumatiſm, the pulſe riſes to 120; and to 150, before the appearance of a critical ſwelling, without danger.

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Diſeaſes of the Arteries.

THE diſeaſes of the arteries are,
Aneuriſm, and
Oſſification.

Aneuriſms are of three kinds, viz, true, mixed, and ſpurious.

The firſt, is a mere ſimple dilatation of the coats of an artery; conſiſting of a ſack or pouch, containing grumous blood, and coagulable lymph; and is generally produced by a loſs of the tonic power of the veſſels.

The ſecond, is from a rupture of the firſt, and moſt commonly proves fatal.

The third, is the rupture of an artery, by ſome means, without the previous dilatation.

This is ſubdivided into three kinds. The cirumſcribed, or encyſted aneuriſm, which generally happens from bleeding.

The diffuſed; this has been before mentioned, page 27.

The varicoſe; this ſpecies of aneuriſm, was firſt diſcovered by the late Dr. Hunter; and is, when an artery and vein are opened at the ſame time, the arterious blood runs into the vein, and goes on by the ſame channel. An inſtance of this we have ſeen, without inconvenience to the perſon, or requiring aſſiſtance.

Where an aneuriſm preſſes on a bone, it becomes carious, by the mechanical preſſure.

The operation of the popliteal aneuriſm, ſo ſeldom ſucceeds, we wiſh to recommend to your conſideration, the following attempt to obviate that complaint, and it's more dangerous conſéquences, the operation performed for its cure.

Apply a tourniquet to the femoral artery, at a ſmall diſtance below where the profunda branches off, and make it gradually tighter; by this means the profunda will have time to dilate, the circulation be carried on by it, the great branch be entirely obliterated by the mechanical

chanical preſſure, and the aneuriſm, we hope will be loſt.

Oſſification of arteries. This diſeaſe is occaſioned by too great a ſecretion, and conſequent depoſition of calcareous matter; and is more common in arteries, than in other parts of the body. It begins under, or in the internal coat; from thence it is continued to the external coat of the artery, and is a ſpecies of corrugation.

It is more common in old than in young people, owing to the impetus of the blood being leſſened, and by this means the diameter of the arteries is diminiſhed. This circumſtance, enables us to account for it's being produced by aneuriſms, from the preſſure of the ſack.

A mortification of the toes and feet, is generally in conſequence of this diſeaſe.

It is very ſeldom ſeen in the veins.

Arteries are leſs liable to eroſion, or abſorption, than any other part of the body. Whenever an eroſion or ulcer takes place, the internal coat of the artery never heals.

We have ſeen a caſe, of an oſſification of the valves of the aorta, an ulcer in it's ſinus, and an incipient aneuriſm.

Obſerva-

Obſervations on Hæmorrhages.

IN ſmall veſſels, the ſuppreſſion of the hæmorrhage, is,

Firſt, by the retraction of the ends of the veſſels.

Secondly, by the muſcular power of the arteries.

Thirdly, by the expoſure to cold air; which has moſt power, in coagulating the blood.

Spirit of wine, acts as a ſedative, in coagulating the blood.

The method of ſuppreſſing hæmorrhages, by ligature, was invented by Johannes de Varico, and Ambroſe Parey.

In the operation for caſtration, tie the artery, without any of the reſt of the chord.

Never tie a nerve with an artery, if you can avoid it; as it ſometimes occaſions a lockt jaw, and other diſagreeable ſymptoms.

Of the Veins.

THE *Veins* are hollow, elaſtic tubes, the reverſe, and continuation of the arteries, are found in all parts of the body, of a conical form, the apex terminating in the heart. They may pulſate there, but this is unknown.

They are ſeven in number; viz. ſuperior, and inferior cava, four pulmonary veins, and the vena portarum. A general deſcription of each, having been given with the arteries, it is unneceſſary to ſay more of them in this place.

The veins are more numerous than the arteries, there being two veins to every artery, (except the kidney, which has but one vein;) and their trunks are conſiderably larger.

The veins of the viſcera always attend the arteries.

The blood in the veins, moves in an equal ſtream, unlike that in the arteries; which may be known by flowing out *per ſaltum.* We remember the relation of a caſe, where the artery lay ſo cloſe to the median vein, that on opening the vein, the motion of the blood in the artery, threw out the blood from the vein *per ſaltum*, and the ſurgeon ſuppoſed he had opened an artery. But the difference of colour, between arterious, and venous blood, will always enable you to diſtinguiſh this; the former being of a florid, bright, red colour; and the latter, dark, and black.

They are divided into two ſets; the one deep ſeated, accompanying the arteries; the other ſuperficial, lying under the ſkin, called cutaneous: theſe two ſets, are only to be found in the neck, and extremities. Their uſe is, to return the blood, when one of them is divided or compreſſed.

The two veins of the neck, are called *internal jugular ſinuses*: they are alſo called *ſinuses*, in the *gravid uterus*.

They are divided into three claſſes.

Sanguiferous,
Seriferous,
Lymphatic;

Correſponding with the three claſſes of arteries, and deſigned for the ſame purpoſes.

The veins have three coats, ſimilar to arteries, which may be ſeparated in the larger ones; they are denſer, and leſs elaſtic than the arteries; when cut through, collapſe; they have muſcular fibres alſo, and are irritable.

They have likewiſe *vaſa vaſorum*, and begin from the arteries, by continuity of canal; by injecting the arteries with mercury, this is demonſtrated.

Fluids paſs readily from the arteries to the veins.

They have *valves* to prevent the retrograde motion of the blood; (generally two in number;) formed by a duplicature, of the internal coat of the veins; are of a creſcent form, the edges looſe, the horny part fixed to the vein. When the blood is driven into the vein, the edges collapſe, and prevent it's retrograde motion.

Theſe are ſometimes ſingle, where a ſmall vein enters; ſometimes, double; and ſometimes, treble.

And always to be found, where there is preſſure.

There is one in the axilla, ſcalp, and coronary vein; and they are very numerous on the extremities, always making a ſwelling on a vein.

The great trunk of the vena azygos,

or intercoſtal vein, has no valves, but the ſmall branches have valves.

The upper part of the veins of the bladder, and ſpermatic vein, have valves.

The valves are wanting in the veins of the *heart*, * *viſcera*, brain, and *inferior cava* of the human ſubject, but are found in horſes and aſſes.

The ſmalleſt veins are probably without valves.

The quantity of blood contained in the human body, is, on a medium, judged to be between twenty and thirty pounds. But this is uncertain, it is different in different people, and is moſt probably greater in fat than lean people; and is ſuppoſed to paſs through the heart, at leaſt, once in two minutes.

On the Diſeaſes of the Veins.

VEINS, from various cauſes, are ſubject to become varicoſe.

The *varix*, is a dilatation of the ſuperficial veins, from inflammation or other cauſes, as the *cramp*, and preſſure of the *uterus*. By theſe means, the muſcles contracting, the deep-ſeated veins are compreſſed, the blood is forced into the ſuperficial veins, which are conſequently dilated, and then become varicoſe.

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* *Stomach, inteſtines, uterus.*

We have ſeen an aneuriſmal varix on the trunk of the vena portarum, which contained worms.

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Of the Lymphatic Syſtem.

THE lymphatic ſyſtem is generally divided into three parts, but we add a fourth.

First, the *thoracic duct*;
Second, the *lacteals*;
Third, the *lymphatics*;
Fourth, the *conglobate*, and *conglomerate glands*.

The *thoracic duct*, is the common trunk of the ſyſtem; is firſt formed on the right crus diaphragmatis, and ſituated on the firſt vertebra lumborum, on the right ſide of the aorta, and left of the vena azygos: in human ſubjects, ſeldom larger than a wheat ſtraw.

At the lower part of this duct, is the *receptaculum chyli,* near the beginning of the vena azygos. It was firſt diſcovered by Pecquet, anno 1661, and has ſometimes been called Pecquet's receptacle, in honour of him. It is formed by the large trunks of the lymphatics, which enter at the lower extremity.

The thoracic duct has blood veſſels, nerves, and muſcular fibres; has three coats, ſimilar to veins. It goes up at the back of the ſubclavian vein, and is ſometimes found divided into two branches; but they are uſually united again, and terminate by two, three, or four orifices in the angles, between the jugular and ſubclavian vein, on the left ſide: from whence the chyle is conveyed with the blood, into the lungs, and there aſſimilated with, and converted into blood.

There is a large gland, in the courſe of the duct, ſituate juſt under the origin of the aorta.

The *lacteals,* or vaſa chylifera, as they are ſometimes called, were diſcovered by Aſſellius in 1662; though we are informed by Galen, they had before been ſeen by Eraſiſtratus in kids; but he did not underſtand their uſe.

Aſſellius ſuppoſed they conveyed the chyle, to the liver; for before the diſcovery of the thoracic duct, the liver was ſuppoſed to convert the chyle into blood. they ariſe by capillary oriſices, from the internal ſurface, or villous coat of the inteſtinal canal, (but principally from the *ſtomach, jejunum,* and *ileum,*) which is deſtined to imbibe the nutritious fluid, called chyle.

They paſs obliquely through the coats of the inteſtine, and running along the meſentery, unite as they advance, and form larger branches; all of which paſs through the meſenteric, or conglobate glands, which are very numerous in the human ſubject.

As they run between the inteſtines and theſe glands, they are ſtiled *venæ lacteæ primi generis*: ſome of them eſcape the firſt ſet of glands, and go to the ſecond. After leaving theſe glands. they are found to be more numerous; and being increaſed in ſize, are then called *venæ lacteæ ſecundi generis.* Thoſe which eſcape the ſecond ſet of glands, go to the third; by this means in ſcrophula, the abſorption is carried on, and the perſon nouriſhed.

They go under the peritonæum, and

in the longitudinal direction of the inteſtine. By this diſpoſition, their trunks being continued longer, than if they went circularly, the fluid is altered; they terminate in the thoracic duct.

In their origin, they are called * ampullulæ, the arteries of which can be injected: theſe are only to be found in the human ſubject, and in a perſon juſt dead after a full meal, by lightening the lacteals. In the beginning they are bulbous, the blood in them cauſing an erection; by ſtraining the inteſtine unwaſhed, through two rings, the mucus will leave the ampullulæ, and with a microſcope, you may diſcover their orifices.

In the inteſtines, they act in a double capacity; abſorb lymph and chyle too. They are ſometimes varicoſe, but afterwards become more cylindrical. Their ſtructure correſponds exactly with the lymphatics, next to be deſcribed.

The *lymphatic* veſſels, ariſe by capillary orifices. We believe that they exiſt in every part of the body, (though they have not been demonſtrated in all parts, as the *placenta,* and *brain.)* They are minute, pellucid tubes; which, like the lacteals, direct their courſe towards the, centre of the body, and pour their contents into the thoracic duct.

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* *Ampullulæ*, a cellular ſpongy body, filled with blood.

As they approach this duct, from the lower parts of the body, they gradually unite, and enter it by three or four large trunks, which form the receptaculum chyli; and the lymphatics from all the other parts of the body, pour their lymph into different parts of this duct. As it runs upwards, to terminate in the ſubclavian vein, except the lymphatics of the right arm, right ſide of the neck, and right lung, the termination of which are to be deſcribed hereafter.

They paſs through the conglobate glands, the changes the lymph and chyle undergo here, are not yet aſcertained.

Their coats are denſe, and tranſparent; and are three in number, like the veins, but are too delicate to be ſeparated.

The firſt, or external coat, is like the ureter.

The ſecond, muſcular.

The third, or internal, to prevent tranſudation, and form the valves.

They are irritable in a greater degree

than the arteries or veins; with which they have no communication, except in the veins, in which they terminate.

They have vaſa vaſorum, and retain their life longer than other parts.

They conſiſt of two ſets, upon all the inteſtinal viſcera; one, ſuperficial, external, or peritoneal; the other, deep ſeated, or internal. The external, lying immediately under the ſkin; the internal, accompanying the large arteries.

In the *liver*, immediately under the peritonæum, they are in great abundance. It has alſo a deep-ſeated ſet, which originate in the *pori billarii.* In the *uterus* alſo, when the peritonæum flies off, the lymphatics come off, and both ſets communicate: they enlarge here, in the ſame manner as the veins.

There are two ſets in the lungs. They here run in between the little lobuli, and form a chain of network, and are eaſily demonſtrated in the lungs of a fœtus.

There are two ſets of lymphatics in the extremities.

In the upper extremity, the firſt or ſuperficial ſet, run on the back part of the fore arm, and then become more deep ſeated. The ſecond, or deep-ſeated ſet, accompany the arteries.

The lymphatics of the lower extremity, conſiſt of two ſets; ſuperficial and deep ſeated. In the leg, the ſuperficial come firſt, to the femoral gland. The deep ſeated come firſt to the popliteal, and then to the femoral, and both go to the inguinal, where the lymphatics of the organs of generation terminate. They then come up by ſeveral trunks, under the ligamentum pouparti, and go on both ſides of the aorta, with thoſe which come from the uterus &c. and join the lacteals which come up in the courſe of the ſuperior meſenteric artery, and all terminate in the thoracic duct.

The thoracic duct, lacteals, and lymphatics, are furniſhed with valves, which are much more numerous in theſe veſſels, than in the veins. Theſe valves are uſually in pairs, 5 or 6 pair in every inch of the tube. They ſerve to promote the courſe of the chyle and lymph, towards the thoracic duct, and to prevent it's return.

A ligature paſſed round the crural artery, in a living animal, by including them, will occaſion a diſtention below the ligature, ſo as to demonſtrate them with eaſe. And a ligature paſſed round the thoracic duct, immediately after killing an animal, by ſtopping the courſe of it's contents, into the ſubclavian vein, diſtends not only the lymphatics, but the lacteals alſo, in the abdomen and lower extremities, with their natural fluids.

In the dead body, they are demonſtrable, by opening the artery, ramifying through any viſcus, (as in the *ſpleen*, for inſtance) and throwing in air, by which they will be diſtended.

One of them may then be punctured, and mercury introduced by a blow pipe.

The lymphatics coming from the right ſide of the neck, right arm, and right lung, open into the angle between the jugular, and ſubclavian veins, of the ſame ſide.

And thoſe of the right ſide of the thorax, paſs under the aorta.

The termination of the lymphatics of the heart, is not well underſtood. Lymphatics can be ſeen in large numbers, in the external part of the heart. For this purpoſe, put the heart of a horſe in water, change the water once in two or three days; examine carefully, and you will ſee them filled with fixed air. When you make the above experiment, tie up all the veſſels in the courſe of the coronary artery.

The lymphatics of the kidneys may be demonſtrated in like manner.

From the teſticles, they go and join thoſe of the kidney; but ſometimes go into a gland, near the abdominal portion of the aorta.

This ſyſtem is nouriſhed after the ſame manner, as all other parts of the body; for even the moſt minute of theſe veſſels, are probably ſupplied by ſtill more minute arteries and veins. This ſeems to be proved, by the inflammation of which they are ſuſceptible; and the painful ſwellings, which ſometimes take place in lymphatic veſſels, prove that they have nerves as well as blood veſſels.

The lymphatics are the only ſyſtem of abſorbents; the proofs of which are,

1ſt. Their analogy with the lacteals.

2ndly. The ingreſs of poiſons into the body; as the venereal, variolous, cancerous, &c. inflaming the glands through which they paſs.

3rdly. The abſorption of matter from ulcers.

4thly. The fluid contained in the lymphatic veſſels being ſimilar to the fluids, contained in thoſe cavities, from which the lymphatic veſſels ariſe.

5thly. The exiſtence of the lymphatic ſyſtem in all animals.

The *manner of abſorption*, is by the mouths of the lacteals and lymphatics, acting as capillary tubes, they abſorb the lymph and chyle, in the ſame manner as a capillary tube of glaſs, (when immerſed in a baſon of water, is enabled to attract it to a certain height;) by this means it is probably conveyed, as far as the firſt pair of valves, which are near the orifice, and the fluid will then be propelled forward, by a continuation of the abſorption. They are ſuppoſed to derive ſome advantages too, from their muſcular coat, and from the pulſation of the arteries near which they lie.

The lymphatic veſſels were firſt diſcovered, in Sweden, by Rudbec in 1662. About the ſame time by Bartholin, in Denmark; and Dr. Jolliffe, in England. In the year 1768, Mr. Hewſon completed this diſcovery, by demonſtrating the exiſtence of lymphatic veſſels in birds, fiſh, and amphibious animals.

The *lymphatic glands*, are conglobate, and are ſituated in the courſe of the lymphatics, which paſs through them; have arteries, veins, nerves, lymphatic veſſels, and cells. The lymphatic veſſels, in their way to the thoracic duct, enter and paſs through them.

In the groin, there are two ſets; inguinal, and femoral. The inguinal, are the glands which are affected by the venereal poiſon: there are however caſes, of a ſecondary bubo, in the femoral glands.

There are lymphatic glands found alſo in the diaphragm.

The glands of the neck, are ſometimes affected by a caries of a tooth.

Stumps, after amputation, and in abſceſſes too, we very often find the glands, in the neighbouring parts affected.

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The Diſeaſes of the Lymphatic Syſtem.

THE diſeaſes of the lymphatic ſyſtem are the *ſcrophula*, or king's evil, as it has been called. In children, it begins in the meſenteric glands, and is then continued on, into the lymphatic glands, which become indurated, and afterwards break out into ulcers. The matter contained in the lymphatics in this diſeaſe, has the appearance of earth and curds.

Conſumptions frequently depend on this diſeaſe.

The lymphatics are too bibulous in the ſcrophula, and it is to be remarked, that where the abſorbents loſe their tone, the exhalants do likewiſe; and *vice verſa*. For example, a *diabetes* has been brought on, by the lymphatics inhaling the moiſture of the atmoſphere.

The *ſal ſodæ*, or foſſil alkali, has been recommended in ſcrophulous caſes, but with what ſucceſs we cannot determine. Neither are we acquainted with any medicine, which may be depended on, to cure this complaint.

Lymphatics are ſometimes opened in wounds, diſcharging lymph from a fungous ſubſtance, of a yellow appearance. The beſt application to it, is the lunar cauſtic, and lint wet with ſpirit of wine over that.

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On * Glands.

WE proceed to conſider the ſtructure and uſes, of thoſe parts of the body, which are deſigned to ſecrete the various fluids from the blood, for the purpoſes of the animal œconomy; called the ſecretory organs or glands.

A gland, is a circumſcribed tumour, found in various parts of the body. They are divided into two kinds, † con globate, and ‡ conglomerate. The lymphatic gland is conglobate, without ſecretion; the kidney is conglomarate in the fœtus, but conglobate in the adult.

By later § anatomiſts, glands are divided, into ſimple and compound.

The firſt requires nothing more than an artery, to it belong the *ſkin, pleura, peritonæum,* the membranes lining the *noſe,*

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* *Gland,* from the greek word *aden,* glandula, an acorn, a term originally given by the greeks, from the lymphatic glands, reſembling that ſubſtance.

† *Conglobate,* a ſubſtance externally ſmooth.

‡ *Conglomerate,* appearing like a number of ſmall kernels joined.

§ Mr. Falconar.

noſe, the *trachea*, &c. the latter of theſe two, ſecretes the fluid, expectorated in *coughs*; the other, the thin rheum, with which colds begin. Theſe are all of them glands, *ex officio*, ſecreting the fluid neceſſary, for their own lubrication and defence.

A ſimple gland, with a reſervatory, is called *folliculi*; to this head we refer the ſebaceous glands.

The ſecond ſet correſpond with each other, in their general conformation; having arteries, veins, nerves, lymphatic veſſels and excretory ducts. The arteries going to glands, are ſuppoſed to be more muſcular, conſequently more irritable, than in the other parts of the body.

The arteries of the *pancreas*, *breaſt*, and *ſalivary glands*, enter at all parts; this we call the ramification of the gland. Theſe glands, with the teſticle, are particularly affected by the nervous influence, and are nearly ſimilar in ſtructure, conſiſting chiefly of excretory tubes. They are moſt liable to *ſchirrus* and *cancer*, and very apt to ſecrete poiſons. The part which ſecretes the poiſon in the *rattleſnake* and *viper*; is like the human ſalivary gland; and the part of the *mad dog*, which is primarily diſeaſed, is that gland.

The *kidney* and *teſticle* have each one centre of ramification; the former when injected, appears like a ſeries of convoluted veſſels.

The *liver* has two centres of ramification. and appears a congeries of veſſels.

The veins return the ſuperfluous blood, after it has performed it's office, to the common maſs, to be with it carried to the heart.

The nerves are diſtributed to every part of the gland.

All the compound glands, have a proper capſule or covering, to connect their different veſſels. They have likewiſe ſometimes an external covering, derived from the membrane, lining the cavities in which they are placed.

The excretory duct of a gland, is made of a very hard, firm ſubſtance; and ſimilar to the external coat of the arteries. It has muſcular fibres alſo, and lymphatic veſſels ariſing from it's internal ſurface, to depurate the fluid. In ſome glands, there are ſeveral excretory tubes, which pour their contents into one common duct, terminating in the receptacle belonging to the gland.

The excretory duct of the *ſpleen*, has not been demonſtrated, ſo that we remain totally ignorant of the uſes of this viſcus; every thing that has been advanced concerning it, being entirely *hypotheſis*. There can be no doubt of it's anſwering ſome important purpoſe in the animal œconomy, but at preſent, the lymphatics are the only excretory ducts, we can diſcover.

The *thyroid gland* has no excretory ducts, ſave the lymphatics; neither has any excretory duct been ſeen in the *renales capſulæ*.

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Of Secretion.

SECRETION, is the ſeparating from the blood various fluids, to anſwer certain ſpecific purpoſes, in the animal œconomy, and requiſite to the preſervation of life and health. Having given a general definition of the apparatus, neceſſary to perform this important work, we proceed to give you our ideas, of the manner in which it is performed. In order to this, we ſhall divide it into four diſtinct heads; which are,

Preparation,
Chemical alteration,
Depuration, and
Excretion.

We conceive that the arteries, have a power to modify the blood, in ſuch a manner, as to bring it nearly to the nature of the fluid, ſecreted by the particular gland, to which it is conveying it; this we call *preparation.* And we apprehend it eſpecially to take place, in the artery going to the teſticle; which, by it's being derived from the aorta. and by it's length, and circumvolutions in the gland itſelf, appears to modify or prepare the blood, for the ſecretion of that moſt important fluid, the *ſemen.*

With reſpect to the *chemical alteration*, the blood undergoes in the body; the ſecretion of the bile in the liver, clearly ſhews that ſuch an alteration does take place in this, and other glands, as the blood when entering the liver, has the ſame taſte as the other blood. This alteration ſeems very much to depend on the nervous influence, though we confeſs ourſelves ignorant of the *modus operandi.*

Depuration, is the taking off from the fluid, after it is ſecreted, the impure parts which are floating in it. This is performed by the lymphatics of the excretory tube, leaving the proper fluid free from any heterogeneous ſubſtances, to be carried by the excretory duct to the proper receptacle, or to be thrown out of the body entirely, and this laſt is what we mean by *excretion*.

The moſt univerſal ſecretion in the animal body, is the lymph; and the glands ſecrete different fluids, at different times.

There will always be a balance in the animal ſecretions, for as one is increaſed, another will be diminiſhed; and *vice verſa*, as one ſecretion is ſtopped or diminiſhed, another will be increaſed: for example, *cold weather*, or the application of *cold water*, by diminiſhing the derivation of the blood to the ſkin, influences and increaſes the ſecretion of urine. In like manner, *fear*, by inducing a contraction of the capillary veſſels, produces the ſame effects. This enables us to account for the large quantity of water, made by hyſteric people. Wine has alſo a like effect. And in ſuppreſſions of urine, the patient is generally in a perſpiration.

We have to mention here, the different parts of the body, to which the blood may be determined. They are the *ſkin*, and this is the moſt common determination of it, for the ſenſible and inſenſible perſpiration.

The *inteſtines.* It is generally determined to this part of the body, after taking food of any kind, to aſſiſt the proceſs of digeſtion, and the making of the chyle. This explains the reaſon of people, with good powers of digeſtion, complaining of cold in the external ſurfaces of the body, after dinner.

The *head*. The blood in caſes of general inflammation, and from other cauſes, is determined to the head, but never with advantage, and ſometimes it's effects produce death.

The *liver*. Under particular circumſtances, the blood may be determined to the liver; but we believe this very rarely to take place. The jaundice is occaſioned, by the blood returning into the cava, being tinged with bile; but this is generally owing to an obſtruction of the excretory duct of the liver, either from gall ſtones, or ſpaſmodic contraction, not from an unuſual quantity of blood, derived to the liver.

The *uterus*. In warm climates, we know that the blood is determined to the uterus by the appearance of the menſtrual flux, much earlier than in this country.

All parts having more blood than is neceſſary for their life, are ſuppoſed to be glandular, and ſecrete ſome fluid neceſſary to the animal œconomy; and it is to be noted, that all parts, which have many blood veſſels, have many nerves alſo: but the gums are an exception to this rule.

The glands on the meſentery of a fœtus, are four times as numerous as in the adult ſubject.

The abolition of the *thymus* gland, is owing to abſorption.

There are two kinds of fleſh in glands; for example, in the *kidney*, there is an external or cortical part, and an internal part, tubular. Theſe tubes receive the urine, as faſt as it is ſecreted, and then open into a common duct, forming the *ureter*, which terminates in the bladder.

Beſides the glands which ſupply nouriſhment to the body, there are others which are deſtined to preſerve clear, the functions of it's various organs; and to carry out of the body, ſuperfluous matters. We are to take ſome notice of theſe in this place, but they will be more particularly treated of hereafter.

The *brain* is a gland, and the largeſt in the human body: it is ſuppoſed to ſecrete a fluid, for the influence of the various organs of the body.

The ſubſtance which is placed in the orbit of the eye, is the *glandula lacrymalis*; this ſecretes the fluid for the lubrication of the eye ball, and keeps the ſight clear by it's ablution. This gland is evidently affected by the nervous influence, in the paſſions; and as we know that it's fluid is taken into the duct, by capillary attraction, and continually propelled forward by the nervous influence, may we not ſuppoſe, that this influence operates as a ſtimulus, not only to the ſecretions, but alſo on the ducts, to carry off the other fluids of the body.

The *kidney* is a large gland, found in all animals, for the purpoſe of ſecreting the ſuperfluous water, from the blood.

The *joints* of the body, are furniſhed with a gland, to ſecrete a fluid for their lubrication, and to enable them eaſily to perform, the various motions of the limb.

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Diſeaſes of the glands.

THE glands of the body are liable to various diſeaſes, but they are more particularly ſubject to two, *viz. ſchirrus* and *cancer.*

The firſt is an indurated tumour, owing to an obſtruction of the gland, and ought to be extirpated as early as poſſible, as all ſchirrous tumours have a diſpoſition to become cancerous.

The *breaſt* and *teſticle,* are the parts, which are generally the ſubjects of this complaint, and indeed all glands, having more excretory tube, than blood veſſels, are particularly prediſpoſed to it.

Cancer, is an unequal ſore or ulcer, formed by the ſuppuration of the tumour before deſcribed, diſcharging a *ſanies* from one or more openings. We recommend extirpation very early, as the only certain, and effectual method of cure; leſt by contaminating the neighbouring parts, at length the whole ſyſtem is affected, and the diſeaſe proves fatal.

It is to be noted, that when the arm is œdematous, the glands in the *axilla*, are affected, and ought alſo to be extirpated, or the diſeaſe will return.

Of the Formation and Structure of Bone.

HAVING given a deſcription of thoſe parts, which make the covering to the human machine, we ſhall here take notice of the principles, and general circumſtances, belonging to that part, which forms the animal frame, giving ſhape, and ſupport to the whole.

Bone is a hard inelaſtic ſubſtance, for the purpoſe of giving form, and ſupport to the animal; to afford a lodgment for the ſoft parts, as the *brain, thoracic viſcera,* and *ſpinal marrow*; and to defend them from injury.

All bones are of a fibrous texture, the fibres branch differently in different bones; in *flat* ones, the fibres are radiated; in the *cylindric* kind, they ſhoot towards the extremities; in thoſe of a *ſpherical* ſhape, *quaque verſum.* They form *lamellæ,* or plates, which are moſt conſpicuous in young ſubjects, or growing bones, and are quite evaneſcent in old age; in it they appear compact, but the fibrous texture may be ſeen when burnt.

Bones ſhoot either in membranes, or

*cartilages; and † oſſification firſt takes place in the centre, and is continued to the extremities. By this means we perceive why the *rickets* affect the joints principally, owing to the ſlowneſs of oſſification in them, in general; and in a weak ſtate, ſo much more ſo, as to occaſion diſeaſe.

They are divided into a middle, and two extremities, the middle is called *diaphyſis*, the extremities *epiphyſes*; the latter form the joints, and receive the termination of muſcles. By this means they afford a more advantageous attachment for the tendons, and remove the muſcles from the centre of motion; in this manner, giving them a greater power of action, than could otherwiſe have been obtained.

Bones conſiſt of two kinds of ſubſtance,
Animate, and
Inanimate.

The firſt, is the vaſcular part.

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* Neſbitt is of opinion, they ſhoot in membranes.

Kirckſtenius, Hewſon, and Falconar, are of opinion, they ſhoot in cartilages.

† *Oſſification* from os, bone, and facio to make the formation of bone.

The ſecond is the earth, which is depoſited in the interſtices of the bones.

Of all other parts of the body, bones at firſt ſight, have the leaſt appearance of organization; they have by many been ſuppoſed to be mere concretes. They are not ſo, but are evidently organized.

They have arteries, veins, nerves, and lymphatic veſſels. The arteries enter at all parts of the bone, and are for nutrition, and ſecretion; acting *ex officio*, as a gland, by depoſiting the earth. The abſorbents perform the ſame office here, as in other parts of the body; may not therefore the *rickets* be ſometimes owing, not to a deficiency of the ſecretion of earthy matter, but to a diſpoſition of the abſorbents, to imbibe too great a quantity of it? And as *rickets* and *ſcrophula*, are ſometimes joined, we may hence reaſonably infer this to be the caſe, eſpecially in the laſt mentioned perſons; the latter diſeaſe being a depoſition of calcareous matter in the lymphatic glands, as being too groſs to paſs them.

The blood veſſels of bones are demonſtrable, by ſteeping the bone in vegetable, or mineral acid; for which purpoſe, the muriatic acid (i. e. *ſpirit of* *ſea ſalt*) is the beſt.

They are porous, for the admiſſion of blood veſſels.

Bone in the adult human ſubject, is of a white opake colour, from the quantity of earth it contains; in old bones, the colour is different, from freſh ones; and the bones of young ſubjects are redder, as having more blood veſſels in proportion to their cretaceous matter. In prepared bones, the colour is different, from various cauſes; and it is different, in different parts of the ſame bone. In ſome animals, it is green, as the *needle fiſh*; and in *birds*, yellow.

The colour is altered, by animals feeding on madder, which ſerves to prove to us, the very great vaſcularity of bone.

Chemical Analyſis of Bone.

Bones yield the ſame elements, as all other animal ſubſtances, *viz.* phlegm, ſpirit, volatile ſalt, empyreumatic oil, and earth. If the * caput mortuum be burnt, in a cloſe veſſel, it gives ivory black; if in an open one, a pure virgin earth, free of ſalt; hence it's uſe in making † cupils.

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* *Caput mortuum* in chemiſtry, that thick dry matter, which remains after diſtillation of any thing but eſpecially of minerals.

The earth, not only of bone, but of all other parts of the body, when it's other principles are deſtroyed, ſtill retains a ſlight degree of adheſion. This is the reaſon, why *ſkeletons* found in vaults, appear perfect, but moulder away, on being touched or expoſed to the air. And the ſolidity of all bones, is in proportion, to the quantity of earth they contain. The tenacity of bone is derived, from the other ſubſtances.

All bones are hollow, and contain animal oil, which is ſuppoſed to tranſude, to prevent the brittleneſs of the bone; but we are certain, it never does tranſude in the living body

They are made hollow, to make us lighter, and by being ſo, are more firm than if ſolid; the intention of nature, being to give greater ſtrength, with the ſame number of fibres, and not for the lodgment of the marrow. Hence in birds, the bones are thin, the cavity large, and annual plants, as corn, &c. are proofs of this.

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* *Coppells* or *cupils*, veſſels made of bone aſhes for the purpoſe of extracting *gold* and *ſilver* from metallic ſubſtances.

When exfoliation takes place, it is from an injury done to the veſſels, and not from an expoſure to the air, as has been erroneouſly ſuppoſed: for example, the bones of birds are hollow, and contain a large quantity of atmoſpheric air, which is carried into the bones from the lungs; by which means they are lighter, both for flying and ſinging; they contain ſcarce any marrow, and no perioſteum.

The cavities of cylindrical bones are cancellated, which is moſt compact in the centre, and more delicate towards the extremities; coarſer towards the ſurface, and reticular, on the axis. In flat bones, as thoſe of the ſkull, the cancellated ſtructure, between the two plates, is called, diploe. In ſome ſubjects, and in many parts, this cancellated ſtructure is wanting.

The cavities of the bones and their fibres, being at a diſtance, enables them to reſiſt a force to break tranſverſely.

Bones are not ſenſible in a ſound ſtate, but highly ſo in diſeaſe. The reaſon why bones are ſo little ſenſible is, becauſe they have but few nerves, and becauſe ſenſibility would have been inconvenient.

We divide bones into four *claſſes.*

In the firſt are all long bones, as thoſe of the *extremities.*

The ſecond contain thoſe of the *head.*

> Theſe conſiſt of two plates, and a middle ſubſtance, the firſt is the external, or cortical part, the middle ſubſtance is the diploe, of which we have taken notice before, and the other is the internal, or vitreous part.

In the third are included the ſpheroidal bones, *viz.*

The *patella,*

The bones compoſing the *hand* and *foot.*

The *oſſa ſeſſamoidea,* which are found near the joints.

Theſe are all covered by a ſtrong ligamentous membrane, to prevent a fracture by the muſcles, which might otherwiſe happen, in jumping or other exerciſe.

The fourth claſs conſiſts of the irregular bones, *viz.*

The *ſcapula,*

Vertebræ,

Os ſacrum, and

Oſſa innominata.

To theſe might be added, the *ribs,*

which are improperly claſſed with the cylindrical bones.

Bones have eminences of different kinds, which are diſtinguiſhed by different names; we ſhall mention their names to you, and alſo the derivation and ſignification of them, as by theſe means, we hope they will be rendered, not only more clear, but alſo more eaſily retained.

* *Head.*

† *Condyle.*

‡ *Tuberoſity.*

§ *Corona.*

‖ *Spine.*

¶ *Supercilium.*

** *Labrum.*

Bones have proceſſes, to give them the neceſſary ſhape, for articulation alſo, and for ſome of them are levers, for giving advantageous attachment to muſcles.

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* A round proceſs with a neck, this always denotes the upper extremity of the bone.

† From the greek word, *condulos*, properly applied to the joints of the finger, it alſo ſignifies an oblong proceſs, from the fore to the back part of the bone, uſed in a ginglimus joint.

‡ A rough, knotty eminence.

§ A ſharp, thin proceſs; alſo acriſt.

‖ From *ſpina*, a thorn; a long, ſharp proceſs.

¶ A brow.

** A lip.

The proceſſes are,

* *Apophyſis*, and

† *Epiphyſis*.

There are alſo cavities in bones, the uſes of which are, for *articulation*, and for giving lodgment to ſoft parts: they are the following,

‡ *Cotyle*,

§ *Acetabulum*,

‖ *Glene*,

¶ *Alveoli*,

** *Foſſa*,

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* From the greek word *apophuo*, produco, a proceſs growing out, from the ſurface of the bone.

† From the greek word *epiphuo*, accreſco, to grow to, being a diſtinct oſſification in young ſubjects, which afterwards growing to the body of the bone, makes it perfect.

‡ From the greek word *kotule*, a cup, a round deep cavity.

§ The ſame.

‖ From the greek word *glene*; it properly ſignifies, the ſocket of the eye, but is alſo uſed to expreſs, a ſhallow cavity in a bone, as cotyle does a deep one.

¶ The ſockets in which the teeth are placed.

** Properly ſignifies, a ditch, but is uſed to expreſs a deep cavity, between two bones.

†† *Groove*,
‡‡ *Sinus*,
§§ *Sinuoſity*,
Hole,
‖‖ *Canal*,
¶¶ *Furrow*.

Bones are combined in two ways, *viz.* articulation, and connection.

By *articulation*, we mean the forms of the parts intended to come in contact; and the relation they bear to one another

Connection, means the binding by ſome other ſubſtance.

Galen divided articulation into *arthron*, and *ſymphiſis*; the firſt is again divided, into *diarthroſis*, and *ſynarthroſis*.

* *Diarthroſis*, ſignifies that kind of articulation, which gives to the joints conſiderable motion: it is ſubdivided into

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†† A deep channel in any bone.

‡‡ A cavity in certain bones, the entrance of which is very narrow, and the bottom wider and more ſpacious.

§§ A ſeries of bends and turns, ſometimes jetting out, and ſometimes falling in.

‖‖ A duct, or paſſage, for any thing.

¶¶ The ſame as groove.

* From the greek words *dia*, cum, with, and *arthron*, membrum.

† *enarthroſis*, *arthrodia*, and ‡ *ginglimus*.

The firſt is the term, proper to joints moving in all directions.

The ſecond is the ſame as enarthroſis.

The third is a ſpecies of articulation, ſignifying flexion, and extenſion, in one direction.

The ſecond diviſion of arthron, is into § *ſynarthroſis*; this comprehends a ſpecies of articulation, having no particular motion: it is ſubdivided into *ſutura*, *harmonia*, and ‖ *gomphoſis*.

The firſt is applied to the articulation of the bones of the head.

The ſecond, is, where the ſurfaces of the two bones, ſo exactly correſpond with each other, that they leave no intermediate ſpace.

The third is, where the bone is driven in like a nail, as the teeth in the jawbone.

The ſecond principal diviſion of articulation, is into ¶ *ſymphiſis*, or *ſyntheſis*;

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† From the greek words, *en*, and *arthron*.

‡ From the greek word *gigglumos*, cardo portæ, the hinge of a door.

§ From the greek words, *ſun*, and *arthron*.

‖ From the greek words, *gomphos*, clavus, a nail.

¶ From the greek word, *ſuntithemi*, compono.

this denotes the connection, or binding of bones by other ſubſtances: it is divided into * *ſynneuroſis*, † *ſynchondroſis*, and ‡ *ſyſſarcoſis*,

The firſt denotes, the connection of bones by ligaments, which were by the Greeks called nerves.

The ſecond, is the union of bones by cartilage, as the epiphyſes, to the bodies of the bones.

The third, is the union of bone by muſcle only, as the *ſcapula* of the *quadruped*. But in the human body, we have no inſtance of this ſpecies of articulation.

It is to be obſerved, that great firmneſs in joints, and great extent of motion, are incompatible; and therefore one of them is generally found to be procured, at the expence of the other: for example, *arthrodia*, is weak; *ginglimus*, ſtrong.

The different ſpecies of articulation

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* From the greek words, *ſun*, cum, with, and *neuron*, nervus, a nerve.

† From the greek words, *ſun*, cum, and *kondros* cartilago, a cartilage.

‡ From the greek words, *ſun*, cum, and *ſarx*, caro, fleſh.

being deſcribed, it may be proper to take ſome notice, of the diſeaſes of the joints, in this place. They are generally, luxations, ſubluxations, and anchyloſis.

A * *luxation* is the effect of a removal of the bone, forming any joint of the body, from it's proper cavity, or articulation; and it may proceed from ſeveral cauſes, either internal, or external. The internal cauſes are, diſeaſe in the head of the bone, or in any of the ligaments, or cartilages, by which it is connected; the external cauſes producing luxation may be various. Luxations immediately produced, and before any inflammation is come on, may be diſcovered by the direction of the limb; as for example, when the ſuperior end is outwards, the inferior end will be inwards, and *vice verſa*. It may alſo be known by the length of the limb.

In order to reduce luxations, in general, it is only neceſſary to place the limb, and indeed the whole body, ſo far as it may influence the direction of the limb, in the greateſt ſtate of relaxation, and by this means, and a gradual extenſion, the bone will be reduced.

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* From *luxo*, to disjoint.

In luxations, the capſular ligaments are ſometimes lacerated, but in this caſe, the parts are generally diſeaſed.

The ſymptoms attendant on luxations are various, but in general there is a defective motion of the limb, or a total loſs of motion, a diſtention of ſome of the muſcles, and a relaxation of others, attended with exquiſite pain.

† *Subluxations* are the incomplete ſtate of the diſeaſe, we have juſt deſcribed, and will generally yield more readily than the former.

In caſe of tumour, or inflammation, attending theſe complaints, they muſt be removed, before attempting the reduction of the limb; and after it is reduced, care ſhould be taken, by reſt and an eaſy poſition, to retain it in it's proper ſituation.

The joints are particularly ſubject to a diſeaſe, called a *ſprain*, occaſioned by a violent diſtraction of the parts, ſurrounding the limb, and attended with conſiderable pain, and for ſome time with great weakneſs, owing to the very great relaxation which takes place. We recommend an embrocation, with diſtilled vinegar, crude ſal armoniac, and laudanum, to be uſed freely.

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† Subluxations, partial diſlocations.

Subſtances are ſometimes contained in the cavity of a joint, requiring an operation to extract them; to perform this, an aſſiſtant is to hold the extraneous matter, firm to the ſide of the joint, and you are then to make an inciſion, through the capſular ligament, and into the joint, in a valvular direction; with the forceps extract it, and cloſe the orifice.

The * *anchyloſis*, is very frequently the cure of a more diſagreeable diſeaſe. In this caſe, nothing is to be attempted. The complaint is occaſioned by the bones growing together, deſtroying the motion of the limb, and may be produced by various diſeaſes of the limb From whatever cauſes it may have ariſen, it is very difficult of cure. If from a rigidity of the tendons, emollient applications, ſuch as the *ol. ped. bovum.* may be tried. Dr. Lobb recommends the yolk of an egg and water, by way of liniment to the part.

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* From the greek word *ankulos*, curvus, crooked.

On the Marrow.

WE are next to deſcribe the ſubſtance, found in the cavities of bones.

Marrow, is found in the cavities of all bones, it conſiſts of a congeries of cells, and forms a part of the glandula adipoſa. It appears differently, in different parts of the ſame bone. Hence it's diviſion into *medulla*, and *ſuccus medullaris*; the medulla being that part which is ſolid, and contained in the middle of the bone; and the ſuccus medullaris, the thin part, which is contained in the cells of the extremities. And it is to be noted, that theſe parts of all long bones, are more vaſcular than their centre.

The cells in which the marrow is lodged, are ſurrounded by plexus's, of ſmall blood veſſels.

In a ſound ſtate, the marrow is not acutely ſenſible, but is highly ſo in diſeaſe.

It's uſe is, as a reſervoir of nouriſhment, and not to prevent the brittleneſs of bone, as has been erroneouſly ſuppoſed. In proof of which, the abſorption that takes place in long continued dropſies,

ſies, in which diſeaſe, not one particle of animal oil is to be found in the bones; the whole being reabſorbed; and this is the only diſeaſe, that reabſorbs the whole of it. And untill the human ſubject is five or ſix years old, though ever ſo fat, ſcarce any animal oil, is found in the bones.

The marrow in human ſubjects, is the ſame as in hogs; it is ſaid to tranſude through the bones into the joints; this is not true, tranſudation never takes place in the living body.

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Diſeaſes of the Marrow.

THE *marrow* is ſubject to the ſame diſeaſes, that all other vaſcular ſubſtances are, *viz. inflammation*, and *ſuppuration*: the *ſpina ventoſa*, is in conſequence of the latter.

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Of the Perioſteum.

THE next ſubject for our conſideration, as an appendage, and immediately connected with bone, is the membrane inveſting it, and called *perioſteum.*

It's ſtructure is of a white, compact, ligamentous, or tendinous nature; more vaſcular than ligaments, has arteries, veins, nerves, and lymphatic veſſels, for the uſe of bone.

Mr. Falconar thought it conſiſted of different layers, the external he ſuppoſed adventitious, as being an expanſion of the tendons and ligaments. But we are of opinion there is no true perioſteum, that it is *ex officio*, a gland, having one centre of ramification. It has ſome ſenſibility in a ſound ſtate, and is very ſenſible in diſeaſe.

The perioſteum has been ſaid, to make a general covering to the ſkeleton, but this idea is not perfectly juſt.

Mr. Falconar ſaid, it might be demonſtrated in the internal cavities of ſome bones, and it very probably exiſted in all; hence an internal perioſteum has been deſcribed, but we do not believe any ſuch ſubſtance exiſts.

The uſes of this membrane are, to give ſmoothneſs to bone, leſſening the friction of ſoft parts, allowing of blood veſſels to be divided into ſmall branches, for entering the bone at all parts; it gives a more commodious attachment to muſcles, and being continued over the epiphyſis's, firmly connects them with the body of the bone.

In the *ſilken fowl*, from the coaſt of Guinea, the perioſteum is black.

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Diſeaſes of the Perioſteum.

THE diſeaſes of the perioſteum, are *inflammation*, and the conſequences attending it; but it ſuppurates unkindly, therefore whenever there is a fluid under it, we adviſe you to let it out as ſoon as poſſible, to prevent it's thickening near the bone.

In venereal nodes, which originate here, cut down through it, with the knife, and dreſs with mercurial ointment, and black ſoap; the latter of which acts as a ſtimulus, and on this principle, brings on a ſuppuration and better diſcharge, than might otherwiſe be expected.

It ſometimes ſloughs, and the bones are affected in conſequence of it.

Of Cartilages.

We proceed to deſcribe the laſt ſubſtances connected with the bones, *viz.* the *cartilages* and *ligaments.*

Cartilages are white or pearl coloured elaſtic ſubſtances, and ſupply the place of bone, and are of *three different claſſes.*

The firſt are thoſe that ſupply the place of bone in the adult, as in the *ear, noſe, larynx. &c.*

Thoſe of the ſecond, ſupply the place of bone, in the early part of life, till bone can be formed.

The third form articular cartilages, or thoſe cruſts, which cover the ends of bones, where they make a proper configuration of them, adapted to form joints. They are covered by a kind of membrane, called *perichondrium,* are moveable in the *lower jaw, ſternum,* and *clavicle*; and in the *knee,* where they are called ſemilunar, or razor-like cartilages.

The ſtructure of the different claſſes, is different.

Thoſe of the firſt claſs, are covered with a ligamentous membrane, ſimilar to the perioſteum; have blood veſſels, which are ſmall and numerous; have alſo nerves, are little ſenſible, and not ſubject to diſeaſe: they bear preſſure better than other parts.

Thoſe of the ſecond claſs, are covered by that perioſteum which afterwards inveſts the bones, and are very vaſcular, admitting arteries, veins, and lymphatic veſſels.

Thoſe of the third claſs, are very elaſtic and compact, and have no veſſels, that can be demonſtrated; yet probably, are not inorganic; have fibres that ſtand like needles at right lines, meeting each other; may be ſeparated by maceration, are inſenſible, and have no perichondrium. The uſes of theſe are, to give ſmooth ſurfaces, to make motion eaſy, to prevent abraſion, and to break the force of colliſion, on the ſame principle as coaches are hung. They are not ſubject to diſeaſe, but may be deſtroyed by diſeaſes in the neighbouring parts; do not *pullulate*, but become black, and ſlough by expſoure to the air; it is therefore neceſſary when they are wounded, to ſcrape them off, but not otherwiſe.

There is a ſpecies of *ligaments*, which are immediately connected with the bones, to be deſcribed in this place.

They are diſtinguiſhed by different names, adapted to their different forms, and uſes.

Thoſe of the joints are called, either round, or burſal; are white, tendinous, and inelaſtic; they are ſtrong, and flexible, and are found only in the joint of the *knee*, and in the articulation of the *os femoris*, with the *os inominatum*. The burſal, or capſular ligaments, ſurround the whole joint, like a purſe; and are to be found, in the articulations, which allow of motion every way. They contain the ſinovial fluid, their ſtructure is of the ligamentous kind, and conſiſts of two layers, different in their nature and origin. Theſe are diſtinguiſhed by the epithets, external and internal: the external one, conſiſts of the ligaments, which tie the bone together, and ſeems to be continued into the perioſteum; the internal is a ſmooth, delicate, thin, reflected membrane, extremely vaſcular, can be traced to the edges of the articular cartilages, but probably is not continued over them.

It's uſes are twofold, the external layer, gives ſtrength, and prevents luxations;

the internal ſecretes the ſinovia, for the lubrication of the joints.

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Diſeaſes of Bone.

THE general diſeaſes, to which bone is liable, we ſhall treat of here, but the diſeaſes of particular parts, will be taken notice of, in treating of the different parts of the oſteology.

The diſeaſes of bone are, the *rickets*; *ſpina ventoſa*; *mollities oſſium*, and *caries*.

The *rickets* is a diſeaſe of bone, from a want of tone in the parts, and a due proportion of earth in the bone, as in this diſeaſe, they are chiefly compoſed of watery fluids. When the ſubject grows older, the earth is ſecreted in larger quantities, than is neceſſary; and this appears to be the reaſon, why rickety ſubjects are moſt liable to the ſtone; a complaint, which we believe to be owing, to an abſorption of the earth of the bones.

The *ſpina ventoſa*, is cauſed by an inflammation and ſuppuration of the marrow.

Mollities oſſium, is a diſeaſe, in which the bones become ſo ſoft, as to ply to any form; and the patients generally void a large quantity of calcareous matter in their urine, previous to the complaint's appearing.

Would not any diet, containing a larger proportion of earth than common, be of ſervice in this diſeaſe? And might not *magneſia*, as the leaſt objectionable *teſtacea*, be given with advantage? eſpecilly as we know, that the earth in the bones, is conſtantly changing; the impure parts being continually abſorbed, and new matter depoſited in it's room. In proof of this, Mr. John Hunter fed himſelf with *madder*, and during the time he was eating it, he obſerved his urine depoſited calcareous matter, tinged with the colour of madder.

Caries are divided into a great variety, by many authors; but we ſhall only mention, the complaint as it moſt commonly occurs, without giving the detail of the different ſpecies, which has been very accurately done, by Mr. Petit, and the late profeſſor Monro.

The ſymptoms attending this diſeaſe, are generally, a deep-ſeated pain in the bone, with a livid colour, and ſpongineſs in the teguments; an ulcer continuing long near the bone, with the granulations appearing of a pale colour, ſpongy, bleeding, without pain, and eaſily penetrable by a probe; the thinneſs, brown colour, diſagreeable ſmell, and larger quantity of matter diſcharged, the bone feeling ſcaly, and unequal.

A ſpeedy, and ſafe ſeparation of the corrupted part, is the proper treatment; and this may frequently be effected, by the compound elixir, or tincture of myrrh with aloes, When this does not anſwer, the bone may be laid bare, and the part taken off, by a proper inſtrument.

End of the Firſt Section.